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Empire news...

Calling all you space tribe commanders: the galactic messengers are reporting on the results of the first interstellar conflicts on page 23.

There is also word on the richest pleostery systems over the last parsec and the latest on empire upheavals and the current peace treaties and warfare.

If you have proved an able commander of space fleets then you may be in our top 10 profit-makers. We also announce the overall champion of our first Seventh Empire conflict.

An entry form for the next April issue turn of Seventh Empire is on page 11 and we announce our overall prize for the top Seventh Empire scorer for the first six months on page 22.

Our Book of Reviews may already have tried to fall out of this issue. But if it's still to be found in the centre pages, you'll find news of over 70 professional software tapes, tried, tested and marked.

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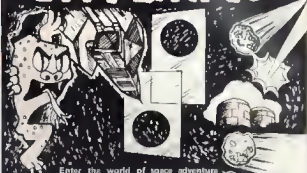
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SPECTRUM DEBATE ...

Dear Sir,
I would like to make my own comments on the so-called BBC versus Spectrum conflict.

Many people believe that the Spectrum is the greatest computer ever made, in the same way that they thought the ZX81 was a year ago.

In fact the Spectrum is only one of many computers with features that are today regarded as standard.

However, the ZX Spectrum has one advantage over all the rest — its price. It is a cheap computer. A "jack of all trades" and master of none.

Inevitably Sinclair's machine will become the most popular, greatly aided by his adverts that leave the readers with both a good impression of his machine and a bad impression of the rest.

The BBC micro is a very powerful machine, no matter how much Sinclair and his fans will degrade it. If it was anything less, it would not have been chosen as the BBC's micro.

Also, the designers of Acorn have taken great care to make sure their machine is not outdated in the future, and as a long term investment this machine is real value for money.
David McKeran,
Sunderland,
Tyne and Wear.

... GOES ON AND ON ...

Dear Sir,
I am writing to you referring to the letter that a Mr McAuley wrote in your December issue. As far as I can see anyone must be stupid at turning down an offer for a BBC Model A, even when a Sinclair

Spectrum with all its extras is offered as an alternative.

For just £60 extra the Model B can become a Model B and many more peripherals are instantly available.

The Tube allows another processor to be added and so at least doubles processing speeds. Even without the second processor the BBC is the 3rd fastest machine according to bench tests.

Delivery has been stepped up immensely. A friend of mine ordered one only a week ago and it arrived yesterday. I bet Sinclair can't say that about his Spectrum or indeed any of his computers. My conclusion is that the BBC computer will still be in great demand by the year 2000.

As for the Spectrum I expect that will be replaced by the ZX83 next year.

If this letter were to be published I am sure it would give people something to think about.

Tim Preece,
Thornborough,
Buckinghamshire.

I KNOW WHAT IS BEST!

Dear Sir,
Truly a remarkable breakthrough in computer magazines. I find your magazine fun to read and very entertaining, especially the software reviews. Is the BBC Defender the only game to get 10/10 for playability?

I write to you concerning the letter sent in by Mr Alan McAuley (December 1982) degrading the model A BBC.

As far as I am concerned the Spectrum cannot match the BBC in any respect. It is the quality of the Beeb that puts it above the competitors.
Mr S. S. Aig,
Fulham,
London.

PRINTER WITH A PROBLEM

Dear Sir,
Having read in many mags that uncle Clive's production is now on schedule, has compelled me to put a finger or two to keyboard.

It was last August, the 1st actually, best date for my credit cards, that I ordered my Spectrum 48K. It arrived on the 11th November — less the printer.

After a couple of phone calls I arrived about a week later. I'll be able to test some of my programmes I thought. Well, it held 10 lines and stopped.

So I sent the lot back. I received a letter asking me what I wanted them to do with the printer. Please return everything in working order I replied.

That was on the 26th November 1982, and I am still waiting.

I can quite understand why Clive has a production problem, obviously repairing more units than he is making.
Kenneth C. Allford,
Sheerness,
Kent.

COLOUR CODE FOR BBC

Dear Sir,
Congratulations on an excellent magazine.

I find the reviews of software a great help in deciding what to spend my money on. I am

particularly looking forward to your "Seventh Empire" competition which I have entered.

I totally agree with M. D. Caballero's remarks about the ZX Spectrum leaflet, in my opinion the BBC model A and certainly the Atari 400 are miles better than the Spectrum — at least the BBC has a decent keyboard.

As for the pathetic sound on the Spectrum being compared to the three channels on the BBC and the four on the Atari I think it's ridiculous!

As you might of guessed I am a BBC owner and I wonder if you might be able to answer a question for me. Are there any Scott Adams adventure games available for the BBC B?

You may also be interested to know that when using mode 2 graphics on the BBC B it is possible to get 255 different shades of colours. The short program below will illustrate this.

10 MODE 2
20 CGOL RND(30), RND(255)
30 PLOT
85,RND(1280),RND(1024)
40 GOTO 10

The method only works if you have a number over about 20 in the first half of the CGOL statement.

Alan Winnett,
Beccles,
Suffolk.

Editor's reply: Sorry Alan, I'm afraid that as yet none of Scott Adams popular Adventures are available for the BBC micro.



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MAILBAG



IAN FINDS A FRIEND

Dear Sir,
With reference to your Mailbag column in the January issue, and the request by Ian Bailey of Streatham, London, I am in the position to be of assistance to him as I own a TRS80 16K level II machine and line printer III.

If he wishes to forward the tapes of the programs to me I will list them for him and return them along with the listings.

W. I. Temple,
Glasgow.

Editor's reply: There you are, Ian, C&VG readers are a useful bunch to know!

BOMBER BACK ON TARGET

Dear Sir,
With reference to *Confessions of a Bug*, October 1982, I have the reason why so many people enquired about the errors in the Atari Bomber program printed in September.

Apparently, the program was written on a 400 which probably had only 16K or RAM. Bomber works perfectly for 16K machines, but problems arise when the memory is expanded.

This is because screen RAM is located right at the top of memory and will therefore change when memory changes.

In the program, all screen POKE locations are those for a 16K machine. I have a 32K 800 and the program would not work for me. When I removed one of the 16K RAM packs, it worked perfectly. I therefore gave amendments to the program, to allow the program to be run on non-16K machines.

Change 10 GRAPHICS 1+16: B=13665 to 10 GRAPHICS 1+16: RAM=PEEK (741)+256*PEEK (742)+33: B=RAM+221

The variable RAM now holds the address of the top left-hand corner of the screen.

Now change, in the program, any occurrence of the addresses below to the expression on the right.
16983-RAM+239

15943-RAM+199
15923-RAM+179
16003-RAM+2549
15965-RAM+221
15745-RAM+1
16205-RAM+461
18764-RAM+90
16183-RAM+439
Christopher Simon,
Clwyd,
North Wales.

SHIFTING MEMORIES

Dear Sir,
I am the satisfied owner of a Commodore VIC 20, but after having it for some months I feel the need to expand it. However this is causing me some concern as I have read that when memory cartridges are plugged into the Vic the memory shifts. Not only does it just shift when cartridges are inserted, but it just shifts differently when you have 512, 8K or above 8K.

Does this mean that programs written for the unexpanded machine will not run on an expanded machine because of the shift? And also programmes that need an expansion of 8K will not run on a machine with a 16K pack even though there is plenty of memory?
Jonathan Phillips,
Lydney,
Gloucestershire.

Editor's reply: The answer to your first question is not without some programming. In answer to your second question — it would depend on the memory expansion board.

SDRTING DUT THE BUGS

Dear Sir,
I have found another bug in the ZX81 manual Appendix A, the character set, starts "The ZX80 character ..."

Is Uncle Clive pulling a fast one, or is yet another bug?
Andrew Park,
Darlington,
Co. Durham.



QUESTIONS FOR VIC

Dear Sir,
As a reader from the first issue of your great magazine I decided it was time to write to you with a question! Is it possible to connect my VIC-20 to Cofax or any other service? If so, how much?

Neal Kovac,
Ruddington,
Nottingham.

Editor's reply: It is possible to connect most microcomputers to the Prestel videodata service of British Telecom. It is not really feasible to use one of the Cefax/Oracle teletext service of BBC/ITA.

The Vic-20, unfortunately, is not the easiest system to interface for Prestel, as it only has 22 columns of the screen whereas Prestel needs 40. B & B computers of Bolitos did manufacture a 40-column adapter which could interface with Prestel — unfortunately Beelines, their supplier, has just gone bust. If you contact them though, they may still have some in stock.

SWITCH TO STATESIDE

Dear Sir,

My son has outgrown his Sinclair ZX81 and is looking for another model.

As we may be moving to the States in the next couple of years, are there any computers, besides the Atom, which are dual voltage and compatible with U.S. TV? He is somewhat interested in the BBC micro, but we suspect it is not dual voltage.

I might add that my son enjoys hours of pleasure with your magazine. No longer is he a TV addict — he's now a computer addict!
J. Mansfield,
Clayton,
Newcastle.

Editor's reply: The U.S.A. and Europe use totally different TV systems. The problem of voltage is easily overcome with a transformer. Unfortunately there is also a difference in mains frequency, 60Hz in U.S.A., 50Hz in Europe. Only

a mains frequency converter will overcome this, and their cost is around £100+.

It is possible to bring U.S. equipment to the U.K., and vice-versa if a transformer/frequency converter is used.

You will need to use a multiple standard TV set/monitor though. These have both the European PAL colour TV standard and the U.S./Japanese NTSC standard on them. Again they are expensive and will cost about £500-£600. Most radio/TV shops in London sell them and they are easy to get hold of.

So, count on spending near £1,000 to enable you to move across the Atlantic. It may be cheaper to buy the appropriate system when you arrive!

MISLEADING ADVENTURES?

Dear Sir,
I have recently purchased a BBC model B micro and several commercial games. Some of these games are excellent, Micro Power in particular. However, there are a lot of very boring games advertised that I consider are misrepresented.

One Adventure game says "what next?" interminably and another "what shall I do now?" until you feel like throwing something at the set. There are some very good Adventure games, with humour but a lot are "user hostile", especially the "Ha, Ha you are dead" type.

My chief reason for writing however is the misrepresentation in advertisements as to whether games have graphics and sound. Many imply this but are only word games. They should clearly state that there are no graphics.

Even this is no guarantee as I have just returned a taped game to one of your larger advertisers asking for a refund for although the advert clearly states that the game has sound and graphics, but it does not.
Allan H. Miles,
Exeter,
Devon.

Chromasonic Hall of Fame No.10

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TWO PINBALL WINNERS

The Bally pinball competition which we set in our September issue has two winners not one.

All the entries were despatched to the US where Bally's team of top pinballs and video game designers sat about judging your entries and thoroughly enjoyed the job too.

The entries were separated into the video game and pinball categories and such was the depth of imagination and careful thought which you had put into your ideas, that it took them far longer than they had thought to come up with a winner.

The result: a winner of each section and several highly commendeds too. Our Pinball winner was Andrew Muir from Grove Road, Norwich with his game Alcatraz who wins a Bally pinball machine to take home and set up in his living room.

Our most imaginative video game designer was 13-year-old Ian Boffin of Lynch Way, Hansell, Woking, with his shark game Jaws. For Ian Bally have put up an extra prize of an Intellivision TV games centre.

Congratulations to these two and C&VG will also be finding something for the entries which came second and third in each category too. Full details of the winning entries will appear next month.

EMPIRES BECKON

If you have already entered our Seventh Empire game, you do not need to re-enter we will include you as soon as possible. But if you are new to C&VG and would like to enter fill in the form below and we will send you a rulebook and fleet starting positions for our next issue.

Please include me in the Seventh Empire game for April.

I would like to name my tribe the

My name is:

Address:

Tel:

PUZZLING SOLUTIONS

For those of you still struggling with the Puzzling problems on page 89, the answers are presented here. But please try them first, either in your head or by using a computer program.

Neah's problem with the ark of confused animals can be just as confusing for humans. In order of the first half the specimens are: Amoeba, Canary, Ferret, Iguana, Locust, Magpie, Oyster, Parrot, Shrimp, Spider, Turkey and a Weasel.

The solution to On the Cards is that Dan took the card with "Vixen" written on it and Bob wrote "Surly".

Turning the digits in our symbol sum into figures gives the following piece of arithmetic:

```

598
597
8947
9152
    
```

And the correct solution to the Cross number problem is printed right:

The Blooming Problem has been left in your capable hands until next month, by which time 19 of you should be the proud owners of a

1	2	1		4	9	1	3
3	5	7	9	1	1		4
	6	1			2	4	
6		9	8	7		9	1
9	7		9	6	1		6
4	9	5	0		4	8	8
2	3	5		1	3	3	1

Vulcan Electronics Hungarian Ring to puzzle ever. Send your entries in by March 12 please.

Finally, congratulations to the winners of our Space Attack problem set in January's Puzzling. A Ripper of Ormskirk, Lancs; E Marten of Southill in Middlesex and G Holden of West Ealing, London; have all won a Computer Games' Galaxy Invader 1999.

Commiserations to the losers none of whom bounced wrongly or made other illegal moves. The best score was published last month. And thanks for the Gandy Monster entries. No prizes here but top scorer was John Lockett of Shrewsbury with 559.

A BUG CONFESSES ALL . . .

They should have known better than to try and sneak a book of games past us.

We shipped Snag Jr. in there at the last moment to cause a bit of havoc with Red Alert on the Vic-20. It does not need the 16K of memory suggested in the write up and runs on a normal 3.5K machine.

Several people couldn't get their Red Alert plane to fire missiles. A complete rundown on the instructions is:

- a—spacecraft goes up
 - ;-spacecraft goes down
 - P—spacecraft goes left (backwards)
 - *—spacecraft goes forwards
- Pressing shift drops the bombs Shift and the asterisk **fires horizontal missiles

Those of you who called on Fruit Machine were having problems keeping the fruits in their boxes. We tracked this down to line 1. The final statement in this line reads "SR=36879".

Dodgems for the BBC Model B

runs on the 1.0 operating system machine and some of the commands in this program will not run on the 0.1 machine.

Texas owners are up in arms about the Pompeii listing which became embroiled in an erupting volcano. A call or letter to the C&VG offices will result in the hidden part of listing being made clear.

T. Hitch got to grips with Keith Campbell's Adventure page. The block and line ranges in figure one should have read: Block 1, 10-50; Block 2, 50-100; Block 3, 100-450.

Missile Command suffered from a couple of missing semi-colons but first people seemed to track these down: 210 was the offender. Each C4 in this line should be followed by a semi-colon.

The editor has asked me to apologise for the lack of a Starweb write-up this month due to a space shortage. Also out went Next Month and the promised version of Donkey Kong for the Vic-20, called Logger. This will appear in April.

spectrum

AN APOLOGY from Spectrum **COLOUR GENIE**

We'd like to apologise on behalf of all SPECTRUM dealers and in fact our suppliers. Unprecedented demand has caused a severe shortage of home computers nationwide. This situation is liable to continue for a few weeks, but as soon as new stocks are available your local SPECTRUM dealer will be among the first to have them.

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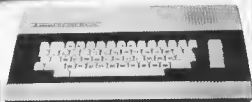
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WATCH THE SKIES FOR DROPOUTS!

ALIEN DROPOUT

Alien Dropout sounds like a leather jacketed, drug smoking, heavy music freak from the outer reaches of the galaxy.

In fact there is nothing Bohemian about these Dropouts. They pursue a calculated scheme to colonise your planet.

The insect-like aliens swoop into ten columns at the top of the screen — building up their forces for the final attack. Once they fill a column with more than five aliens one of them swoops down — Galaxian style — and explodes on impact with the ground, throwing out deadly debris.

Armed only with a laser beam your task is to shoot the aliens out of the columns before they amass sufficient numbers to swarm towards you.

The Dropouts are controlled by their leader — a giant butterfly-like alien who edges down the screen towards you when things are getting rough for his drone ships.

Alien Dropouts is based on the arcade game Zygon and is the



latest addition to the Superior Software range of games for the BBC model B.

Also new from Superior is a fruit machine simulation with many of the features of the bar-room favourite such as hold, nudge, and gamble.

Both games are available now from the Leeds firm at £6.50 inclusive.

OUT FOR THE COUNT IN CASTLEMATH

You can't count out the Mad Maths Master of Castle Math!

This is an adventure game where you can only make progress by solving sums set for you.

Once inside the castle, a variety of creatures pop up to set more sums to be solved and at different intervals. There are also a few surprises to keep you interested.

Castlemath is the latest addition to the Audiegic range of software for the Vic, and is designed as a fun way of improving your maths.

Also new from Audiegic this month is a novel game entitled the Pit. You play the part of a bewildered workman who has to go from one side of the screen to the other picking up money bags — all the time dodging a deadly deluge of hail which is pouring from the sky.

Castlemath is available from the Reading-based firm at £8.95 with The Pit at £7.95.

MANOEUVRES MADE EASY IN TEXAS

WARGAME

Wargames enthusiasts can spend hours setting up the battle and positioning their troops and armaments.

Now there is a quicker way to enjoy the battle without the danger of losing any of the pieces or completely taking over the living room floor.

Everything you need to play is stored on this latest computer program for the TI93/4e.

You can play against an opponent or put your wits against the computer.

Each time you play the computer randomly generates a map, so each game should be different. The rugged terrain is made up of woodland, hills, marshes, and open plains.

Take it in turns to move one of your six guns to a new position or lob a shell at the enemy using the joystick.

You must move all six guns in turn and the computer will tell you which one to move by making it flash.

Wargames is the latest game from TX Software of Harlow. It is available on cassette at £6 from the Essex firm.

TX's golf simulation has been bought by Thom-EMI and will be released with their range of TI software which will be launched later this year.

THOSE LITTLE GREEN FOOTBALLERS!

ALIEN SOCCER

If you are put off taking a journey to the stars because you would miss that one precious Carlingham pastime — soccer — then this latest game for the Vic reveals an encouraging discovery about aliens — they play football too.

Alien Soccer is a weird combination of some of the best elements of soccer and pinball.

You control an alien Pat Jennings who moves from right to left trying to stop the ball from crossing the goal line.

Kick the ball up screen and it will rebound around a variety of obstacles notching up points for your team.

Alien Soccer is the latest game for the unexpended Vic 20 from Rabbit Software.

Also new from Rabbit this month are Kiells and Mynad — space attack games for the unexpended Vic.

These latest additions to the Rabbit Careless Arcade Collection retail at £9.99 from the Harlow-based firm.

MAN-EATER GUARDS THE CHALICE

CHALICE OF KALMAR

Your only guide in the quest for the Chalice of Kalmar are the occasional flashes of lightning which illuminate your way as you follow the winding path.

If you go off the path you will be pushed back outside the temple walls.

Just to make things a little more interesting you are also being pursued by a man-eating monster.

The B-side of this cassette has a second game on it called Penguin. This is a straightforward shoot 'em down game involving a penguin.

Chalice of Kalmar and Penguin run on the TI99/4e and are available from Apex software of Brighton at £3.95.



Illustrations: Jan Davis

GAMES NEWS

THIS TOWN
'AINT BIG
ENOUGH

HIGH NOON

It's high noon and the James gang are terrorising a sleepy western town.

Can you bring gun law to the streets of yoni unhappy town?

With your sheriff's badge gleaming in the bright sunlight you step bravely forward.

Who knows what may be lurking behind the shuttles of the saloon, the undertakers, and the offices of the stagecoach company.

You'll need a quick finger on your trigger as the desperados appear from behind windows and walls to take pot shots at you.

But shoot straight as the good people of the town are also in hiding and a stray bullet could easily kill any one of them.

High Noon is the latest game from Abbex Software for the Sinclair Spectrum and runs in 16 or 48K.

Also now from Abbex this month is a classic Adventure entitled *Ausls Folley* and a robot shoot-out game called *Android Run*.

All three games are available from the London based firm at £4.95.

CAN'T KILL
A GOOD
INVADER!

SPACE INVADERS

There's no getting away from *Space Invaders* — and a new version is due out this month from the BBC Model B.

Using Mode 5 colour graphics, these invaders are an accurate copy of the classic arcade game and even feature an auto-play demonstration mode to attract attention when no-one is actually playing it.

Bug Byte are also converting other arcade-proved games for the BBC micro.

City Defender recaptures the thrills of another arcade



favorite, *Missile Command*.

In this game the skies are not filled with vapour-trails of descending missiles. A cluster of earthbound meteors are headed down towards the cities.

The other difference is that the defence of the cities is undertaken by a steerable rocket which is launched by the player. Tactics in this game vary from the player who elects to defend all his cities to those who would rather concentrate on saving one from destruction.

Threshold is a BBC version of the popular Apple game of the same name.

Wave after wave of aliens have invaded the atmosphere and earth's defence is in your hands. The first wave inundates left-to-right across the screen with appropriate graphical and sound effects.

If you survive that one a galaxy-type wave heads down the screen towards you. There are 12 waves altogether, gradually increasing in deadliness.

All the above games run on a BBC Model B and cost approximately £8. They are available from Liverpool-based Bug Byte.

Bug Byte also has a *Vic-20* offering due out this month. *Vic Scramble* is identical to the arcade original and runs on a basic 3.5K machine for £7.

THE IDENTIKIT
ALIENS ON
THE RAMPAGE
GLADIATORS

A do-it-yourself alien kit is part of the magic of *Galactic Gladiators*.

This game of alien combat takes place in the deadly confines of a sealed off galaxy known as *The Bubble*.

You take the part of a leader of a troop of aliens who are your warriors. This troop is made up of identikit creatures with attributes like strength, endurance, weapons, speed and skill.

These are given an armoung-plating and weapons and sent off into combat. The stronger they are the more armory they can wear and weapons they can carry.

The game runs on an Apple II or III and comes from the U.S. company of S.S.I. under the Rapid Fire label. It is available over here from Pete & Pam Computers of Rossendale in Lancs, at a cost of £22.95.

Pete & Pam Computers also have another *Rapid Fire* Apple game in their warehouse at the moment. *Cytron Master* is set in a galaxy where all disputes are settled by robotic creations

rather than human or alien idiosyncrasies.

These robotic warriors are known as Cytrons and those who pursue the life of commanding these creations are known as Cytron Masters.

At his command, a Master will have such things as laser blasting cytrons, mine cytrons, guided missile cytrons and mobile bunkers cytrons.

When two Cytron Masters are battling it out, their aim is to destroy their opponents' command centre. Only one top Cytron can survive.

The game is for two players or for one player to try and match the computer's cytron genius.

It is a fast and furious action game with three speed levels, so that beginners can learn the tactics. *Cytron Master* retails at £22.95.

EATING OUT
DOWN AT
THE SWAMP

SWAMP CHOMPERS

Swamp Chompers are not particularly attractive creations. But these mud-spattered inhabitants of the swamps of Muckadoo are your alter-egos in this new U.S. game for the Atari computer.

Between your character and its feeding station is a swamp infested with alligators and other terrifying creatures. Once you've left home, you have only 40 seconds in which to reach the feeding station and then return home.

If you make it across the swamp, jump into a flying machine to travel to your lair which contains the magic ingredient to turn you into a swamp chomper, a creature capable of eating its former enemies.

The transformation lasts just nine seconds — and special bells emerge who suck the blood from swamp chompers during that time.

Ghosts also feature for extra chomping time. There are 13 different screens to build your score up, each getting more difficult.

It is available from Hallowood based Centissoft on cassette or disc at a price of £21.95.



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3. **ARROW OF DEATH (Pt 1)** — A blight has fallen on your homelands, the Baton has become tarnished and now radiates a malevolent aura of Evil. Your mission is clear — trace the source of this Evil and destroy it or be destroyed. This is the first part of an Epic Adventure although each part can be played as a stand alone scenario.
4. **ARROW OF DEATH (Pt 2)** — You now have the means to destroy your enemy but you are far from home and this land is strange to you. Can you cope with the deadly perils which approach you and have you the strength to see your mission through to the final conflict?
5. **ESCAPE FROM PULSAR 7** — Alone on a grotesque Space-Freighter. The rest of your crew have died horribly at the hands of a mutated Zoo-Spectator. Your only chance of escape is to reach the Fast Shuttlecraft. But the lurking Monster is hungry and you are the only food it has left.
6. **CIRCUS** — Your Car has run out of Petrol on a lonely road miles from habitation. As you trudge reluctantly down the road in search of help you are suddenly confronted by an amazing sight. In a nearby field is a Huge Circus tent! But this is no ordinary Circus as you will soon discover.
7. **FEASIBILITY EXPERIMENT** — Far across the gulfs of time and space a dying race of super-intelligent beings search the Universe for a Hero to save their existence. At length their thoughts turn to planal Earth. You are chosen to be their saviour in a bizarre scenario where death is a mere thought away.
8. **THE WIZARD OF AKYZR** — You are in the Royal Palace. The King beseeches you to rescue his daughter from the evil wizard. If you succeed your reward will be priceless. Failure will bring certain death.
9. **PERSEUS AND ANDROMEDA** — Travel into the realms of ancient mythology. Battle with grotesque monsters and supernatural powers as you search for the hidden secrets of myth and legend.
10. **TEN LITTLE INDIANS** — This mystery begins with a train journey into a strange country. What secrets are held by the strange country mansion? What meaning is attached to the strange idols? Maybe you will find out if you live long enough.

* Adventures 5, 6 and 7 require 32K RAM

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VIDEO NEWS

BEAT OFF SWARMS OF BUGS

BUG-OFF

There's a whole swarm of the nastiest creeper-crawlers all pined to ruin anybody's picnic in the new game Bug-Off.

Your character is armed only with a water gun and he must fend-off the bugs by squirting them.

Using a joystick, you can chase the bugs to any corner of the screen to finish them off.

The game is for a 16K machine on cassette or 24K disc and costs £19.50 for the Atari 400. It comes from U.S. software house, Adventureland and is distributed over here by Calisto Computers of Birmingham.

Out of the same stable comes Toote Fruite which is a Pacman type game — but this time without a maze!

Instead of gobbling dots, Toote Fruite challenges you to fruit, ice-cream and sweets, as you steer clear of the bugs.

Available for the Atari in 16K cassette or 32K disc from Calisto, it also costs £19.50.

SECRETS DOWN IN THE DUNGEON

DRAGON LORD

Dungeons and Dragons comes to computerised life on the Dragon in a multi-level adventure from the keyboard of Bob Chappell.

There are seven levels of dungeons in the Lord of the Dragon, all filled with some of the nastiest creatures you would expect to find in the dank dark places — trolls, hobgoblins and werewolves.

It is a combination of text and graphics from Item Limited, based at Fulmer, Buckinghamshire.

Other offerings from Item include a quotation quiz game, Who Said That with some 68 quotes to place.

Nightmare Peak has you rushing about in a gloomy city peak dodging the horrors and

trying to lead them to their deaths.

And Noah's Ark is another classic computer game converted to the Dragon. The computer is given some questions to ask about certain animals to deduce which one you are currently thinking of. If it gets the answer wrong it questions you on how it might have guessed the animal correctly and learns new animals.

This fascinating program shows simply how a computer can be taught and gives an insight into the most basic artificial intelligence.

All the programs run on the Dragon 32 computer and cost £5.95 except Who Said That which is a little cheaper at £3.95.



A REAL MAN EXPLORES THE JUNGLE

FLOYD

It takes a man of real character to set off on a quest through a jungle infested by dangerous pygmies, hungry crocodiles and man-eating tigers.

Such a man is Floyd of the Jungle and his mission is set among tropical vegetation in the Atari 400. He is tackling the jungle to save his girl from the

pygmies, crocs and tigers in an arcade style romp in the style of Canyon Climber.

Chopper Rescue is a scrolling scramble type game with bombs and missile bases and a helicopter. It is a multi-level game with a series of different challenges.

And Hell-Cat Ace is World War Two action from the cockpit of an American fighter pilot. A flight simulator with plenty of Japanese levels to tangle with above the Pacific Ocean.

These three games all run on the Atari and come from Micropro Software in the U.S. They all cost £29.50 and are available from Calisto Computers in Britain.

Calisto has also commissioned a U.K. Battle of Britain version of Hell-Cat Ace, called Spitfire Ace which should appeal more to the U.K. audience.

THE MANY ARMED MONSTER...

BLACK SQUID

The Black Squid is a game of memory and menace on the sea-shore.

It's a shore you may never see again as you swim desperately through the rocks and giant clams, dodging the top of a black tentacle on your shoulder.

The rocks are invisible in the murky waters but everytime you hit one, that particular rock and all those you have previously hit flash up on the screen for a second.

Memorise their position if you can because rocks distract the squid and if you can lead the dark beast into a lot of them you'll have a better chance of making it to the sea shore at the top of the screen. The giant



clams are more dangerous.

The Black Squid needs at least 8K on RAM expansion on the Vic/20 and it costs £39.50 from Preston-based Channel 8 Software.

Also new from Channel 8 is a children's game of I-Spy which is aimed at the learning to read age-group. There are 10 topics in the text-based game, from which a child can choose to spy.

Among these are I-Spy which is the zoo, circus, farm, shops and high street. Like the children's game, the computer gives the player a letter and asks it to guess what could be seen beginning with that letter at the given situation.

It retails at £9.95 and runs on the Atari 400 and 800.



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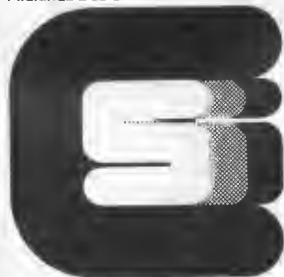
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CVG 3

BATTLE REPORTS

Sixty battles raged in the galaxy last turn and all were successfully repulsed.

The most one-sided battle took place at top where 272 defending fleets from the Sun Empire destroyed one attacking fleet from Bloodline controlled Jadeg.

The closest contest was at Olex where Pirate Empire fleets stormed in and 94 attackers were narrowly defeated by 107 defenders. With the aloft of the Diplomatic Diagram this turn Olex may well fall earning rich pickings for the attackers.

Several defending fleets suffered damages to the better mounted attacks and notes of all bonuses are included below.

Xakag, defenders suffered -1 loss, Sonar, defenders' loss -2, Vapor -2, Rurus: -2, Naxig: -2, Olex -1, Okap -1, Jadeg -5, Keper: -1 Yusas: -2, Sidal: -7, Hakub: -2, Minap: -1, Girax: -1, Otan: -2. The heaviest loss for the defenders came at Medan where the Sun Empire attackers from poor Roril shared out a defeat of -11 among the defending force.

Only three star system defenders salvaged a profit from their successful defence: those at Apal earned a Battle Bonus of 1, the Rolek defenders added the energy of rich Minep attackers to their score, a Battle Bonus of 1 and Tuxus defenders also added one to their profits.

The only significant change in the Diplomatic Diagram below is that the Bloodline Empire and the Dead Empire have negotiated a peace treaty - finally forgiving that Ice Warrior for murdering their emperor (C&VG December).



The Diplomatic Diagram

FOZUZ ○	LARUB ♦	VIBET ♦	XOLIP ♥	ITIL ♥	FUNUS ♥	LULIP ♥	YANOK ♥	KOKEG ♦	ISOX ○
VIZAX ○	QIRUS ♥	HAZAN ♦	ABOB ○	SONER *	VEPOZ ♥	QATOT ○	HEZOD *	ASOL *	SUXLK ♥
BAROV *	WIDAN *	RURUS ○	MUPIP *	NAXIG ○	BETID ♦	WAVAB ○	RIVEY *	MEGUD ○	NABOK ○
DALIX ♥	OLEX ♥	TASAT ♥	CAZUV *	GOVAX ♥	DITUG ♦	OKAP ♥	TOXAZ ♦	CIXAN ♦	GOTEG ♥
ERAK *	KOVEL ♦	USUG *	PEBOB ♥	JADEG ♦	ENAK ○	KEPAR ♥	UGON ♦	POROV ♦	JINIS *
FADIS *	LOKIX ♥	YUSES *	XAPUS ○	INIP *	FAGIL ♥	LIZAG *	YODAZ ♦	XUGOD *	IBFD ♥
VASUX *	QUNIX ○	HIPEB ♦	ASOR ○	SIDAL ♥	VIZET ♦	QAVUV *	HAKUB ○	APEL ♦	SABAG ♥
BUREP ♥	WAGAP ♥	ROLEK ♥	MINEP ○	NUVEK ♥	BAZIX ○	WUPIV ♥	RORUL ♥	MEDEN ♦	NUZET *
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The Galactic Map

Orders in Block Caps please

Name:

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AT	1st Movement phase		2nd Movement phase	
	ACTION	STAR	ACTION	STAR
FLEET 1				
FLEET 2				
FLEET 3				
FLEET 4				
FLEET 5				
FLEET 6				
FLEET 7				

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CHESS



WISDOM OF THE MACHINES

Computer chess has long been used by workers in the field of Artificial Intelligence as a testbed for human reasoning and how it can be programmed into a computer. A useful spin-off has been a gain in knowledge and understanding of the game itself.

Work at the Machine Intelligence Research Unit at Edinburgh University in the last few years has focused on the endgame King and Knight against King and Rook (abbreviated to KRKN).

Amongst those studying this ending have been two players of master strength — the Yugoslav player Ivan Bratko and U.S. master Danny Kopec.

Unlike most endgames which have been studied by Artificial Intelligence researchers, KRKN is genuinely hard even for masters, although fortunately rare in practical play.

Conventional wisdom states that the ending game is in general a fairly straightforward draw, but this turns out not to be true.

As the game goes on both sides must take care to spot any possible forks.

With the Rook's side (assumed to be white) to move, only a slight majority of legal positions are drawn. However, it is important for Black to stay in the centre of the board, because the won cases occur with the King in the corner.

Here is an example of a difficult position.



FIG 1 a b c d e f g h

tion for the defending side with the King in the corner.

White to play by 1. K-N6!

If now 1... N-B1ch; 2. K-B7, N-R2; 3. R-N6 mate. So Black must play 1... K-N1; whereupon

White wins by 2. R-N2! Now 2... K-R1 allows a lethal pin, (3. R-R2), so Black must play 2... N-B1ch; with the continuation 3. K-B6 ch, K-R1; 4. K-B7 with a rapid checkmate. Strangely enough, Black can draw if it is his move in figure 1.

After 1... N-B1; White has nothing better than 2. R-N3. Black now has the

astounding drawing move 2... N-K2!

There must be few masters who would play such a move with confidence.

Now Black's Knight is separated from the King and there are mating threats to contend with. However, there is no way for White to exploit these facts.

For example, if 3. K-N6, K-N1; 4. K-B5ch, K-B2 with a drawn position away from the corner. This example is taken from *Advances in Computer Chess 2*, published by Edinburgh University Press in 1980, which contains two lengthy articles on the work of the Edinburgh team.

Although their work had much more ambitious goals concerning how expert knowledge might be represented and stored in a computer, from a chess viewpoint alone it is quite remarkable



FIG 2 a b c d e f g h

Here is another of their examples (Black to move).

Most strong players would surely now play 1... N-K5 ch to bring the King and Knight together (by N-R4 subsequently). However, Black's only drawing move is the apparently suicidal 1... N-Q8ch.

Work of this kind calls seriously into question the idea that the endgame is well understood at least by grand masters.

Even for this four-piece endgame there are numerous previously unsuspected problems and even such an apparently definitive to me as Reuben Fine's *Basic Chess Endings* has clear-cut errors as well as severe omissions.

Figure 3 is an example of the textbook lapsing (Black to move).

This position is a variant of one which was first analysed in the ninth century. White can win in 14 moves. Black's first move is effectively forced, 1... N-R4 ch; with the best play for both sides continuing 2. K-N5, N-N2.

Now the textbook gives 3. R-KB 8 an exclamation mark, although R-K R5 is best and wins one move sooner. More seriously, *Basic Chess Endings* rejects 3. R-R7 because of 3... K-N1; 4. K-N6 "drawn".

This is true but playing 4. K-B6 would

win. After 3... R-KB8, Black's reply 3... N-Q3 ch is forced.

The textbook analysis continues 4. K-QB6, N-QB5; 5. R-Q8! The exclamation mark is Reuben Fine's, but in fact it is a sub-optimal move which extends the



FIG 3 a b c d e f g h

game a further 6 moves than necessary until White's eventual win is reached.

Analysis of this kind shows that the textbook not only occasionally misjudges whether a position is won or drawn but frequently gives a move which is not the best. If this is the case with a four-piece endgame, the unavailability of the rest of the textbook must be open to suspicion, to say the least!

The question remains, how is it possible to write with such confidence of the best moves in positions which seem to defy expert analysis?

Certainly the answer is not by analysing the game out to a conclusion each time. There are positions where it takes White 27 moves to win (i.e. 27 White moves plus 26 Black moves).

Assuming that each player has an average of 10 moves in every position, there would be 10 to the power 53 variations to consider before making the first move.

Nevertheless, the KRKN ending is now completely solved for every legal starting position. I shall return to this topic next month.



BY MAX BRAMER

TV GAMES CENTRES TV GAMES CENTRES TV GAMES CENTRES VIDEO

STICK STAND

The Stick-Stand was the cheapest and simplest product we tested. Basically it's a plastic stand into which your standard Atari joystick fits snugly. You also get a little red ball which slips onto the top of the standard stick to improve the grip.

Simple but effective. The wide-bottom base provides a good stable support for the stick — and that little red ball does improve playability — especially when the on-screen action gets fast and furious. Made by the U.S. firm Byte, the Stick-Stand costs £7.95.

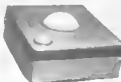


TRACKBALL

The Wico trackball is truly a video games gourmet controller.

Once you get used to this unusual method of control and develop some speed, it gives you unbelievable responsiveness and adds greatly to playability of any game.

Left and right commands are fairly easy to master but up and down movements are a



little bit more difficult to control. You will have to readjust your Pacman technique accordingly!

My one reservation with the trackball was with the fire button. This was particularly heavy and clicked unnecessarily every time you released a missile.

It would also have been an improvement to have a fire button in the top right hand corner as well as the top left for left-handed people.

Getting the right joystick for your TV games centre is becoming as difficult as choosing the right squash racquet or set of golf clubs.

Adverts claim all sorts of things for sticks — that they will increase your scores and turn you into a pro-player.

We have already reported on the latest batch of souped-up sticks now being imported into this country from the States and this month the C&VG staff sat down at our Atari VCS and played a few games using the sticks — purely for research you'll understand!

Here we bring you the results of our bench-tests on four of the new sticks — plus the novel Wico Trackball and the simple but effective Byte Stick-Stand.

Our general impression was that these sticks add a great deal to your game and will prove a valuable addition to your games centre.

Most of the sticks we tested were in the £15 - £25 price range — less than one of the top of the range VCS controllers. Pretty good value in our humble opinion.

We would like to thank Silica Shop, of Sidcup, Kent, who supplied the sticks we tested, and import them from the States.

The trackball does not come cheap. At £49 you would have to forgo one or two games which you have had your eyes on for some time in order to pay for it. But in my opinion this would be well worth it.

DATABASE

If you are the proud owner of an Interton VC4000, Radofin, or Acetronic video games centre then you might not be quite so proud of the ever decreasing range of games available.

As these little-known machines have not generated the mass sales of, say the Atari, Phillips or Intellivision machines there is not a large enough owner base to support independent software. It also means that the firms who produce the machines do not tend to produce a very wide range of games themselves.

The situation has been improved slightly by the production of an adaptor from Volt-maco which enables all software for the Database system to be played on any of the above machines.

The range of games for the Database is probably about the most up to date of the se laser

known machines and includes versions of the popular arcade games Frogger and Pacman.

The adaptor plugs into the software ports on the various machines and the Data base software is then inserted into it.

The adaptor is available at £4.50 from the Baldock, Hertfordshire — based firm.

LE STICK

Le Stick from Datasoft is a really nice idea. A joystick without a base seems the easiest way to describe it. It works when the player tilts the stick in the direction he wants to move, and a pressure sensitive "switch" inside the stick freezes the action if the player squeezes it gently.

As I've said before it's a really nice idea. However in practice — on a video games centre anyway — it's just not responsive enough. You really need a lot of practice to get it working as well as one of the



WICO LEAD

regular design sticks.

We tested it on more and more space-type games and found it difficult to keep control of the action — which, of course, is all important in TV games.

Le Stick, which costs £24.95, may come into its own when it's used for computer games — but unfortunately our testers just couldn't give it the C&VG seal of approval — despite the nice design concept.

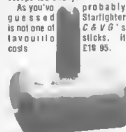
STAR FIGHTER

Suncom's Starfighter is described by its makers as the ultimate joystick. Well, in our opinion, despite the two year warranty that comes with it, the stick fails to come up to this extravagant claim.

The Starfighter stick is short, stubby and difficult to get a good grip on — you'll soon be suffering from Astro Fighter thumb or some such affliction that all video game players suffer from from time to time.

The fire button is not one of this stick's best features. It's slow and allows those aliens to escape too easily.

As you've guessed it's not one of our favourites either. It costs £19.95.



WICO STICKS

The Wico Command Control range of joy sticks are the best known "gourmet sticks" as they are termed in the U.S., where they are currently the number one sellers.

There are two sticks in the range — the Red Ball stick and the Extended Lever stick.

Both are highly responsive

ES CENTRES TV GAMES CENTRES VIDEO SCREEN

and offer you a choice of two fire buttons. One is mounted at the top of the joystick itself and the other at the base for those of you used to those of the Atari joystick.

The Red is the dearest £27.95. The ES less — was not reflected in extra



responsiveness.

Both Wico sticks are compatible with Atari VCS, Atari 400 and 800 and the Commodore Vic-20.

An adaptable the be plugged T199/4a, T.R.S. S.O. computers, produce an lead for sticks



is useful for those people who like to sit in their armchair and play. It sells for £5.95.

TAKE A MAD GORILLA HOME TODAY!

DONKEY KONG

It's Mad Mario, a crazy gorilla and a beautiful blonde mean nothing to you then you have not played Donkey Kong.

This hit arcade game is now available in cartridge form for Atari VCS owners.

A couple of shops who managed to get hold of advance copies of the game before Christmas sold out in a matter of days. Coleco have promised fresh supplies for March.

For the uninitiated you play the part of Mad Mario who is trying to rescue his girlfriend from the clutches of a gorilla.

To get to your girl you must run along steel girders and up ladders while hopping over barrels and fireballs that the gorilla is throwing down at you.

Donkey Kong is one of a range of well known arcade titles which have been taken out of the arcade and converted to VCS format by the now video games company Coleco.

Also released this month are Gorf — a space attack game.

Wizard of War takes you down into the dungeons where you have to outwit and vapourise the wizard's monsters. You have a radar device to help you negoti-

ate the constantly changing maze.

Carnival is a simulation of a large ground shooting gallery. Blaze away at the clay pipes, dancing bears and sitting ducks.

The Coleco range of VCS games will be available from most major video games stockists at around £28.

Coming soon are Zaxxon, Turbo, Lady Bug and Cosmic Avenger.

Most of Coleco's titles will shortly be available for the Intellivision machine and also for ColecoVision's own machine which will be launched in the Spring.

This year hundreds of set-top boxes for TV games centres will go on sale. Not just new and original games but new versions of old favourites.

The Atari VCS will continue to get the majority of the new releases as more people own Atari centres than any other machine and therefore there are greater potential sales.

To help you make the best choice when buying a new game CAVG will be reviewing similar games in one batch and picking the best one.

GO WHERE OTHERS FEAR TO FLY

STAR RAIDERS, STARMASTER, STAR VOYAGER

Nowhere is the competition for sales tougher than deep in space. You can do battle with the Krylons of Star Raiders, Zerkons of Star Voyager, and the Starfighters of Starmaster.

These 3D space games from the big three VCS manufacturers Activision, Imagic and Atari are due on the same day.

You pilot a craft hurtling through space at breakneck speed. Your mission is to seek out the enemy ships and destroy them while avoiding their fire and protecting your Starbases.

The first cartridge I plugged in was Atari Star Raiders.

This is an impressive package complete with a touch-pad which plugs in to the right hand joystick socket on your VCS, and operates in conjunction with the joystick.

The touch pad controls five flight functions whilst the other joystick steers the ship and fires your photon torpedoes.

You can call up the galactic map to see your position, your starbase, and the whereabouts of the Krylons. By pressing forward you go back to the view from the cockpit of your ship.

Hyperwarp sucks you through the galaxy at great speed to the space sector you have selected on the galactic map.

The novel touch-pad add-on controls a tracking computer and protective force field, which you must learn to use selectively as they draw heavily on your fuel supply.

Star Raiders is a most playable game. Difficult but addictive. At first it requires a lot of effort to

Star Voyager does have one unique feature. Every so often you get an audible signal telling you a star portal is in close proximity.

You must fix your sights on this and fly towards it.

As you get nearer the tiny square will grow larger and larger till it fills the screen which then flashes through a sequence of colours. When this is done you have then passed safely through a star portal.

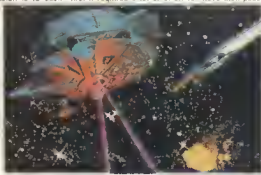
Activision's Starmaster is the closest to the Atari original with a galactic map and an excellent sniper speed simulation.

Starmaster has the best attack computer display of the three games. As you

fly into a sector occupied by enemy ships the control panel turns red. Hits on the enemy cause the screen to flash red. Yellow flashes mean the enemy has scored a direct hit on your craft.

Starmaster and Star Voyager both retail at around £25.00.

For game presentation and sheer game play Star Raiders at £29.95 is the best of the bunch. Although Starmaster gives the toughest fight.



master all the controls.

Imagic's Star Voyager is much easier to get the hang of.

Apart from the oncoming aliens there are only three other controls to be watched — radar screen, energy level, and the number of enemy hits.

Star Voyager is also easier because the aliens come at you in a uniform corkscrew movement as opposed to the random dodging of Starmaster and Star Raiders.

ARCADE

PIGGIES IN THE MIDDLE

The secret of success at maze-chase games is knowing what to expect of your pursuers.

In the two screens of Amidar, the chasing warriors end cuddly toys are more predictable than most arcade pursuers — one goes around the outside of the rectangle filled screen (the tracker) and the other four (the Amidars) turn each time they come to a corner.

Amidar is a game of screen filling. A network of staggered rectangles provides the lines for your gonilla to travel on and each time you paint around a square it fills in, adding to your score.

The first screen Amidars are warriors and your best tactic is to go to the bottom left-hand corner and clear that area. At this point all the Amidars are on fixed routes and remain so until you reach your next objective, the top right corner, when they all begin to follow you as best they can.

Fill this corner while the tracker is at the top of the screen and follow it around the edge closely. Then Amidars won't cut in between you and the tracker.

It will lead you to the top left-hand corner. Clear that area and head for the screen center to do the same there, before moving to the final corner.

Leave the square in this corner until the Amidars are surrounding you, then complete it. This will have the same effect as

TIPS ON AMIDAR

making a Pacman energiser — the Amidars will turn nine and turn tail and can be eaten for bonus points.

Don't blindly follow them, they are not any slower but aim to meet them head on. A dead Amidar falls to the bottom of the screen and if it hits you on the way you'll lose a life.

You have now earned a bonus screen, consisting of a rough maze connecting a female Amidar, pink, piggyish cuddly toy, at the top of the screen and a bunch of bananas at the bottom. Press the "jump" button as the pig reaches the entrance that leads to the bananas, for a 5,000 point bonus.

Amidar's second screen proper turns you into a paint roller. The Amidars and tracker are all pink pigs and you can only get points for squares connected to one another.

Start by going right up the middle of the screen for 2,740 points. You can then go to the four corners to turn the pigs yellow and chop 'em a bonus.

If the tracker comes off the outside loop during this screen, beware! Any second she is going to slip right onto your tail end stay there. Every time you clear all three screens, you get a 2,000



point bonus, then it's back to the first screen with an extra Amidar.

The "jump" button causes the Amidars to spin for a second and you can then pass through them. Press it only when right next to one, on a collision course and don't hold the button down, it repeats.

You only get so many jumps each screen and you cannot afford to waste any of them. So, be positive.

Extra lives come at 50,000, 70,000 and every 500,000.

BLINK AND DON'T MISS

If you don't like being wretched, you're in for a nervous time when you play Eyes — because they're everywhere!

Small eyes haunt the screen maze, while their larger compatriots roam at will and if they blink, you may well have looked your last upon this life.

You also resemble an eye-like creature in this game and your task is to eat as many of the smaller eyes (Pacman fashion) as you can while travelling around the maze and clear the screen.

When confronted by a larger specimen, your options are to fire quickly before it can turn to look in your direction or dodge out of its line of sight.

Missiles from the eyes travel in a straight line. And while they do travel faster than you can run,

EYES

death is hardly instantaneous. It is possible to dodge around a corner and watch it pass harmlessly by.

The secret of survival is not to get caught on a long corridor a few inches away from the nearest exit and not to be tempted to fire at an eye in the mistaken belief that its death will stop the oncoming bullet. It won't.

The only safe way to fire at eyes, is before they have fully turned a corner.

The game is played at a leisurely pace and appears a lot easier than it actually is. Killed eyes return to hunt a few brief seconds later and materialise on the outside corridors — so keep an eye out for them.

A DRAGON AT THE END OF THE TUNNEL

SUPER ZAXXON

Super Zaxxon takes the graphics of its predecessor and improves the game.

You still have to attack the blue space fortress, watching your shadow and altitude to gauge position and height above the deadliest of arcade batteries. Missiles, laser guns, tracking antennas and force fields bar your way and there's a small tunnel which must be entered low in the centre of the screen.

This is made more awkward by having a missile launching pad just before the tunnel entrance. The tunnel is a new Zaxxon feature which inhibits your altitude and makes the player light his way past planets, flying minelayers, self-destructing robot spacecraft and indestructible mines.

The final challenge is with a larger-than-life fire-breathing dragon. Only six hits into his lery mouth can kill the dragon which dwells your attack vessel.

The most useful thing you can do in Super Zaxxon is to help check your altitude and it still suffers from looking better than it plays.





The year of the mutant - that's what 1983 is turning out to be. Pinball manufacturers are pinning the video world for game themes and some strange hybrids are appearing.

Williams have gone to that all-time arcade winner, Defender, for a theme. Their latest pinball shown at the recent Amusement Trade Exhibition - has mutants, swimmers and smart bombs built in to the game. And a complicated pin it is too.

To start off with the machine has four buttons - one pair to operate the flippers, the other two with different functions.

The second button on the right-hand side of the machine operates a lane change feature. The left hand button works a 'kick-back' device - similar to a feature on early Bally games - which saves a ball destined for oblivion down the out chute. You have to earn points to use it of course.

There's also a mysterious Smart Bomb feature which, on review, Gary Flower of the Pinball Owners Association didn't have time to fathom. It's also a multiball game which adds to the excitement. All in all a challenging and different pin.

THE RECORDS TUMBLE

The competition on high scores is really hotting up with some records changing hands almost daily.

Tim Haywood's Pacman score has been the main victim of the host of new record scorers. It has now been doubled.

Tony Eaton found his way into the local paper with a 1,674,500 score. He munched his way through 138 screens and it took him two and a half hours. That beat most of the claimants for the Pacman record.

But he was recently bettered by David Ross, a victim of our

HAVE A BALL DOWN BELOW

MR DO

The joys of tunnelling are fully exploited in the surrealistic world of Mr Do.

Dig-Dug first tempted gamblers below the surface, but Mr Do takes the best from that game theme and improves on it.

Mr Do is a pixie-like creature with a magic ball who spends his time below ground being chased by some small hungry crimson dinosaurs. He runs through existing tunnels and can create new ones, only more slowly.

The dinosaurs can also dig new passage-ways but prefer to chase you through tunnels of your own making.

Large golden apples lie buried in this subterranean world and these act like the locks in Dig-



Dug. Tunnelling up underneath makes them rather shaky and a split second later they plummet down on top of anything following you.

When the dinosaurs get too close you can spin around and fire your magic ball at them. This bounces through the passage way and can knockout a whole herd of pursuing creatures if it hits the leading one. But they are only KO-ed briefly and your magic ball disappears for a number of seconds.

AN ISLE SO NEAR...

SWIMMER

Come on in, the water's interesting. Swimmer may look just like a plunge into the river in search of an idyllic isle but there's a lot lurking beneath the blue waters.

Treasure island is what your Swimmer should be aiming for with the aid of an eight-way joystick and a dive button but there's a few problems going against the current.

There's the driftwood for example. And watch out for those curious turtles, they bite! You can gather the floating fruit for bonus points but keep a watch out for a monstrous crab, which

is waiting for you at the end of the third screen.

Small giant crabs also close in, fast and hungry and it's time to hit the dive button, hold your breath and swim under your adversaries.

If you aim for a golden ring floating amongst the enemies, it can turn your swimmer into a snailman, invulnerable to your enemies, but only for so long.

Back to more mortal and there are six water spiders and vicious piranhas in the river.

The aim is to defeat the host of predators and find the sanctuary of treasure island.

After a while the dinosaurs split up and start coming at you from different angles. When things get too close for comfort and even your magic ball can't keep them all at bay, then there is another answer.

A flashing prize in the centre of the screen can be collected by Mr Do and this has the effect of disabling the dinosaurs. But in stead a whole host of new blue monsters with gnashing teeth appear at the top of the screen and come after you.

These can also be KO-ed by the magic ball and will also join in their chase and eventually give up to be replaced by the dinosaurs again.

The mazes are dotted with lampling red cherries which Mr Do must eat. Once all these have been cleared he is free to go onto the next screen full of yet more cherries, apples and dinosaurs but with a different maze.



SCRAMBLE
2,332,230
James Thomas

TEMPEST
1,000,260
Paul Mitchell

GOLF
972,030
Gary Miller

GALAGA
1,223,290
Carl Warrington

FAST FREDDIE
1,279,110
John Gregor

FROGGER
116,150
Richard George

DIG-DUG
999,990
Tooba Zaidi

DONKEY KONG
420,300
John Bull

OIX
263,020
Sarabjit Singh

CRUSH ROLLER
471,530
Alan Dowler

PACMAN
2,934,470
David Ross

AMIDAR
782,010
Adrian Eyle

ROBOTRON
537,450
David Ross

PENGO
17,410
Terry Prall

PHOENIX
480,330
Niall Monaghan



```

100 REM DEFUSE
110 REM BY J. DAVIES
120 REM
130 REM SET CHARACTERS
140 CALL CLEAR
150 CALL CHAR(104,"0000000007071F1F")
160 CALL CHAR(105,"0000243CFFFFFFF")
170 CALL CHAR(106,"00000000E0E0E0E0")
180 CALL CHAR(107,"1F1F070707073F3F")
190 CALL CHAR(108,"E0E0E0E0E0E0E0E0")
200 CALL CHAR(109,"3F3F7F7F7F7F2323")
210 CALL CHAR(110,"FFFFFFFFF3C1000")
220 CALL CHAR(111,"FCFCFEFEFCFC4C4C")
230 CALL CHAR(112,"1000000000000000")
240 CALL CHAR(113,"")
250 CALL CHAR(114,"0000000000000000")
260 CALL CHAR(115,"18183C5A99181844")
270 CALL CHAR(116,"187E7E1818187E7E")
280 CALL COLOR(10,5,16)
290 CALL COLOR(11,14,16)
300 CALL COLOR(12,15,15)
310 CALL COLOR(13,12,16)
320 RESTORE
330 FOR I=136 TO 144
340 READ A$
350 CALL CHAR(1,A$)
360 NEXT I
370 DATA 0210301010101030,
023044040510707C,0030400410044430,
00001020407C0000,007C007000404430

```

Illustration: Terry Rogers

DEFUSE

A chain of nuclear reactors is ready to explode — and only you can stop them!

Your job is to defuse this potentially explosive situation by entering each reactor and shutting it down.

The reactors appear at random, and you must steer your nuclear expert through them. This defuses the reactors — but gives your little man a radioactive trail which he must not cross.

There's another snag too — the reactors must be defused in the right order — otherwise it's apocalypse time!

The game features full colour graphics, sound effects and full instructions. It will run on a Texas TI99/4 or 4a no peripherals are needed.


```

380 DATA 2018204078444438,207084081020,020,
2038444438444438,20373444430208030
390 DEF RAN(X)=INT(X*RND)+1
400 RANDOMIZE
410 FCOLOUR=16
420 CALL COLOR(16,9,9)
430 INPUT "DO YOU WANT INSTRUCTIONS 'I'?"
440 IF SEG$(Q$,I,1)~"Y" THEN 450 ELSE 490
450 CALL CLEAR
460 GOSUB 2110
470 GOTO 500
480 IF SEG$(Q$,I,1)<"N" THEN 430
490 REM SKILL LEVEL=No, REACTORS=4
500 CALL CLEAR
510 INPUT "GIVE YOUR SKILL LEVEL
(1 TO 5) ":SKILL
515 SK=SKILL+4
520 IF (SK/9)+(SK/5) THEN 510
530 FOR I=2 TO 8
540 CALL COLOR(I,2,1)
550 NEXT I
560 REM BORDER
570 CALL CLEAR
580 CALL SCREEN(16)
590 CALL HCHAR(1,1,152,32)
600 CALL HCHAR(24,1,152,32)
610 CALL VCHAR(1,1,152,24)
620 CALL VCHAR(1,32,152,24)
630 REM DISPLAY REACTORS
640 CALL COLOR(3,16,5)
650 CALL COLOR(4,16,5)
660 CALL COLOR(15,16,9)
670 CALL COLOR(14,16,9)
680 FOR REA=1 TO SK
690 R=RAN(22)
700 C=RAN(32)
710 REM CHECK AREA IS CLEAR
720 FOR RSCAN=R-1 TO R+5
730 FOR CSCAN=C-1 TO C+4
740 CALL GCHAR(RSCAN,CSCAN,GET)
750 IF GET<>32 THEN 690
760 NEXT CSCAN
770 NEXT RSCAN
800 CALL HCHAR(R,C,104)
910 CALL HCHAR(R,C+1,105)
820 CALL HCHAR(R,C+2,106)
930 CALL HCHAR(R+1,C,107)
840 CALL HCHAR(R+1,C+2,108)
850 CALL HCHAR(R+2,C,109)
860 CALL HCHAR(R+2,C+1,110)
870 CALL HCHAR(R+2,C+2,111)
880 CALL HCHAR(R+3,C,112)
890 CALL HCHAR(R+3,C+1,113)
900 CALL HCHAR(R+3,C+2,114)
910 CALL HCHAR(R+1,C+1,135+REA)
920 CALL SOUND(200,800,0)
930 CALL SOUND(100,750,0)
940 NEXT REA
950 REM
960 REM THE GAME.....
970 R=RAN(22)+1
980 C=RAN(32)+1
990 CALL GCHAR(R,C,GET)
1000 IF GET<>32 THEN 970
1010 CALL HCHAR(R,C,96)
1020 REM GET KEY AND MOVE
1030 CALL KEY(K,S)
1040 RT=R+(K=67)-(K=68)
1050 CT=C+(K=83)-(K=68)
1060 CALL GCHAR(RT,CT,GET)
1070 IF GET=113 THEN 1180
1080 IF GET=120 THEN 1410
1090 IF GET<>32 THEN 1140
1100 CALL HCHAR(R,C,120)
1140 FCOLOUR=25-FCOLOUR
1150 CALL COLOR(14,FCOLOUR,9)
1160 CALL COLOR(15,FCOLOUR,9)
1170 GOTO 1030
1180 REM DEFUSE

```

```

I190 CALL GCHAR(R-3,C,GET)
1200 A$=CHR$(GET-87)
1210 A=VAL(A$)
1220 IF A<N+1 THEN 1920
1230 N=N+1
1240 CALL HCHAR(R-3,C,GET-87)
1250 GOSUB 1330
1260 IF N=SK THEN 1990
1270 R=R-5
1280 CALL GCHAR(R,C,GET)
1290 IF GET=32 THEN 1410
1300 RT=R
1310 R=R+5
1320 GOTO 1190
1330 RESTORE 1390
1340 FOR I=1 TO 21
1350 READ NOTE
1360 CALL SOUND(-500,NOTE,0)
1370 NEXT I
1380 RETURN
1390 DATA 400,450,440,660,480,
900,550,540,540,500,600
1400 DATA 500,560,550,520,520,
480,660,440,470,480
1410 REM RADIATION DEATH
1420 FOR I=30 TO I STEP -3
1430 CALL SOUND(200,611)
1440 NEXT I
1450 FOR I=1 TO 10
1460 CALL COLOR(9,14,16)
1470 FOR D=1 TO 50
1480 NEXT D
1490 CALL COLOR(9,3,16)

```





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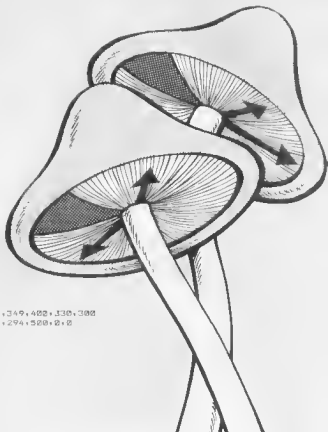
1500 FOR N=1 TO 50
1510 NEXT D
1520 NEXT I
1530 CALL (1100, 7, 1, 1, 1)
1540 CALL (1100, 1, 1, 1, 1)
1550 CALL (1100, 1, 1, 1, 1)
1560 IF GET = 105 THEN 1580
1570 CALL (1100, 1, 1, 1, 1)
1580 GOSUB 1730
1590 CALL CLEAR
1600 CALL COLOR(3,2,1)
1610 CALL COLOR(4,2,1)
1620 PRINT "YOU RAN OVER"
1630 PRINT "YOU HAVE DIED"
1640 PRINT ""
1650 PRINT "WOULD YOU LIKE TO TRY AGAIN?"
1660 PRINT "(YES OR NO):"
1670 N=0
1680 INPUT N$
1690 IF SEG$(N$,1,1)="Y" THEN 430
1700 IF SEG$(N$,1,1)="N" THEN 1720
1710 GOTO 1680
1720 STOP
1730 REM FUNERAL MARCH
1740 RESTORE 1800
1750 READ NOTE,DUR
1760 IF (NOTE=0)*(DUR=0) THEN 1790
1770 CALL SOUND(DUR,NOTE,0)
1780 GOTO 1750
1790 RETURN
1800 DATA 294,400,294,300,294,240,294,300,349,400,330,300
1810 DATA 330,350,294,350,294,300,277,350,294,500,0,0
1820 REM WRONG REACTOR
1830 FOR I=1 TO 30 STEP 2
1840 CALL SOUND(-1000,-7,I)
1850 FCOLOUR=25-FCOLOUR
1860 CALL SCREEN(FCOLOUR)
1870 NEXT I
1880 CALL SCREEN(9)
1890 GOSUB 1730
1900 CALL CLEAR
1910 CALL SCREEN(16)
1920 CALL COLOR(3,2,1)
1930 CALL COLOR(4,2,1)
1940 PRINT "YOU DEFUSED THEM IN THE"
1950 PRINT "WRONG ORDER"
1960 PRINT "THEY ALL BLEW UP"
1970 PRINT "YOU WERE KILLED!"
1980 GOTO 1650
1990 REM SUCCESS.....
2000 GOSUB 1330
2010 CALL CLEAR
2020 PRINT "CONGRATULATIONS!"
2030 CALL COLOR(3,2,1)
2040 CALL COLOR(4,2,1)
2050 N=0
2060 PRINT ""
2070 PRINT "WELL DONE...YOU JUST SAVED"
2080 PRINT "THE NATION"
2090 PRINT ""
2090 GOTO 1640
2100 REM INSTRUCTIONS
2110 FOR I=2 TO 8
2120 CALL COLOR(1,16,5)
2130 NEXT I
2140 CALL SCREEN(5)
2150 CALL CLEAR
2160 R=1
2170 M$="DEFUSE"
2180 GOSUB 2560
2190 R=2
2200 M$="*****"
2210 GOSUB 2560
2220 R=4
2230 M$="DEFUSE THE NUCLEAR REACTORS"
2240 GOSUB 2560
2250 R=5
2260 M$="EACH ONE IS ABOUT TO EXPLODE"

```

```

2270 GOSUB 2560
2280 R=7
2290 M$="THEY ARE DEFUSED BY MOVING"
2300 GOSUB 2560
2310 R=8
2320 M$="UP BETWEEN THE REACTORS LEGS"
2330 GOSUB 2560
2340 R=10
2350 M$="THEY MUST BE DEFUSED IN THE"
2360 GOSUB 2560
2370 R=11
2380 M$="CORRECT ORDER"
2390 GOSUB 2560
2400 R=14
2410 M$="BEWARE OF THE RADIATION TRAIL"
2420 GOSUB 2560
2430 R=15
2440 M$="WHICH YOU LEAVE BEHIND"
2450 GOSUB 2560
2460 R=17
2470 M$="USE THE FOUR ARROW KEYS"
2480 GOSUB 2560
2490 R=20
2500 M$="PRESS ANY KEY TO PLAY DEFUSE"
2510 GOSUB 2560
2520 CALL KEY(0,K,S)
2530 IF S=0 THEN 2520
2540 RETURN
2550 REM MESSAGE DISPLAY
2560 C=16-LEN(M$)/2
2570 FOR I=0 TO LEN(M$)-1
2580 CALL (1100, R+C+I, ASC(SEG$(M$, I+1))
2590 CALL (1100, R+C+I, ASC(SEG$(M$, I+1))
2600 NEXT I
2610 RETURN

```



```

10 PAPER 7. CLS : BORDER 7: IN
K 0
200 PRINT AT 0,0:"Welcome To Po
0111":RT 2,5:"By Jonathan Yeoma
ns0
30 PRINT AT 5,0:"Instructions":
RT 5,0:"For The Computer To Break A
Wait For The Computer To Break A
40 PRINT AT 11,0:"21Rm For Th
Ball 0 Your":AT 13,2:"Choice
AT 15,2:"Input D Direction And
Strength":AT 17,3:"Press Return
And Watch":AT 20,5:"Press Any K
ey to continue"
50 BEEP AND .1,RND*50: IF INK#
Y$="" THEN GO TO 55
90 BORDER 7. PAPER 7: CLS : IN
K 0
100 FOR n=0 TO 7. READ a: POKE
USA "a",n: NEXT n
110 DATA 8,IN 0,111100,8,IN 0,1111
110,BIN 1111111,BIN 1111111,BIN
N 1111111,BIN 1111111,BIN 0111
1110,BIN 00111100
120 INK 4.1: PLOT 119,0: DRAW 135
0: DRAW 0,155: DRAW -135,0: DRA
W 0,-155
130 INK 4.1: PLOT 135,7: DRAW 104
0: PLOT 245,15: DRAW 0,54: PLOT
245,90: DRAW 0,53: PLOT 125,15.
DRAW 0,64: PLOT 126,90: DRAW 0,
62: PLOT 135,151: DRAW 103,0
140 PLOT 134,7: DRAW -6,5,-PI.
PLOT 235,7: DRAW 9,0,PI: PLOT 12
0,50: DRAW 0,10:PI: PLOT 247,153: DR
W -8,5,PI. PLOT 126,153: DRAW 5
,0,-PI
150 INK 0
160 PRINT AT 3,23: INK 1:"0"
170 PRINT AT 14,23: INK 2:"0"
T 15,22: INK 2:"000":AT 16,21: I
NK 2:"0000"
180 PLOT 0,50: DRAW 0,50: PLOT
10,105: DRAW 50,0
190 PLOT 19,60: DRAW 80,50: PLO
T 19,120: DRAW 50,-50
200 PRINT AT 5,5:"AT 5,5:"2"
AT 5,5:"AT 5,5:"3"
AT 12,1:"6":AT 8,1:"5":AT 5,
1:"8"
210 PRINT AT 14,1:"Balls":AT 15
,1:"Left":AT 17,1:"Points":AT 18
,1:"Lost":AT 14,8:"10":AT 17,8:"
0"
220 GO SUB 700
300 LET potted cue=1250: LET bl
=10: LET d=23: LET h=140: LET
13: LET d=23: LET h=140: LET
. LET missed ball=1000: LET pott
ed ball=800: LET hit second red=
650: DIM a(10): LET hit red=500
LET x=13: LET y=20: LET s=1: L
ET s=10
305 LET g(3)=c: LET g(5)=d
310 INPUT "Strength 7 to 40":d
315 IF s1:40 OR s1<7 THEN GO TO
310
315 LET x=g(3): LET y=g(5)
320 LET s=0
325 IF d=0 THEN LET x1=-1: IF d
=1 THEN LET y1=0
325 IF d=2 THEN LET x1=-1: IF d
=3 THEN LET y1=1
330 IF d=3 THEN LET x1=0: IF d=
3 THEN LET y1=1
335 IF d=4 THEN LET x1=1: IF d=
4 THEN LET y1=1
340 IF d=5 THEN LET x1=1: IF d=
5 THEN LET y1=1
345 IF d=6 THEN LET x1=1: IF d=
5 THEN LET y1=-1
350 IF d=7 THEN LET x1=0: IF d=
7 THEN LET y1=1
355 IF d=8 THEN LET x1=-1: IF d
=8 THEN LET y1=-1
400 PRINT AT x,y: INK 1:"0": BE
EP 0,20: PRINT AT x,y:
410 LET x=x+1: LET y=y+1: LET
s=s+1: IF s=1 THEN GO TO miss
d ball
420 LET b=ATTR (x+x1,y+y1)
430 IF b=50 RND y<29 THEN LET
y1=-1
435 IF b=50 RND y<17 THEN LET
y1=1
440 IF b=50 RND x<19 THEN LET x
1=-1
445 IF b=50 AND x<3 THEN LET K
1=1
450 IF b=55 THEN GO TO hit red
450 GO TO 100
470 GO TO 100
500 PRINT AT x,y, INK 1:"0": LE

```

```

T 9(3)=x1: LET g(5)=y
510 LET x2=x+1: LET x=x+2. LET
y=y+1: LET y=y+2
530 LET s=s+1: LET s=0
540 PRINT AT x,y: INK 2:"0": BE
EP 0,30: PRINT AT x,y:
545 PRINT AT g(3),g(5): INK 1:"
0"
555 INK 0
580 LET b=ATTR (x+x1,y+y1): LET
b1=ATTR (x,y)
570 IF b=50 THEN GO TO hit seco
nd red
590 IF b=50 RND y<17 THEN LET y
1=-1
591 IF b=50 RND y<29 THEN LET y
1=1
594 IF b=50 RND x<3 THEN LET x1
=1
595 IF b=50 RND x<19 THEN LET K
1=1
600 IF x=20 RND y=15 THEN GO TO
potted ball
602 IF x=20 AND y=30 THEN GO TO
potted ball
604 IF x=11 AND y=15 THEN GO TO
potted ball
605 IF x=11 RND y=30 THEN GO TO
potted ball
605 IF x=2 RND y=15 THEN GO TO
potted ball
610 IF x=2 AND y=30 THEN GO TO
potted ball
615 LET s=s+1
620 LET x=x+1: LET y=y+1: IF
s=5 THEN WHEN PRINT AT x,y: INK 2:"0"
IF s=2 THEN GO TO returnball
630 GO TO 540
640 GO TO 550
650 PRINT AT x,y: INK 2:"0"
660 GO TO 620
700 FOR n=3 TO 13. PRINT AT n,2
3: INK 1:"0": BEEP .1,n: PRINT A
T n,23: INK 1:"0": NEXT n: PRINT AT 13,
23: INK 1:"0"
710 PRINT AT 14,23: INK 0:"0"
T 15,22: INK 0:"0":AT 16,21: I
NK 0:"0"
715 LET a1=0: LET b1=0
720 FOR n=1 TO 10
730 LET a1=INT (RND*11)+15: LET
b1=INT (RND*15)+0: IF ATTR (b1,
a1)<55 THEN GO TO 730
730 BEEP .1,n
740 PRINT AT b1,a1: INK 2:"0":
NEXT n
760 RETURN
800 RESTORE 800: FOR n=1 TO 17.
READ a,b: BEEP .5,b: NEXT n
810 DATA 1,0,1,0,1,5,1,5,1,2
5,1,0,1,5,1,5,1,7,1,1,1,5,1,5
1,2,1,1,2,0,9,1,2,1,3,7,1,1,7,1,5
820 LET bl=bl-1: PRINT AT 14,5:
BL:"0"
830 GO TO 310
902 IF b=50 AND x<19 THEN LET K
1=-1
1000 PRINT AT 1,1, PAPER 1: INK
5: FLASH 1: "Missed": FOR n=0 TO
50: BEEP .1,n: NEXT n: PRINT AT
1,1
1010 LET g(5)=RND*11+15: LET g(3)
=(RND*15)+3: PRINT AT g(3),g(5)
: INK 1:"0"
1020 PRINT AT 17,0:PI
1030 GO TO 310
1200 IF x=20 AND y=15 THEN GO TO
potted cue
1205 IF x=30 RND y=30 THEN GO TO
potted cue
1210 IF x=11 AND y=15 THEN GO TO
potted cue
1215 IF x=11 AND y=30 THEN GO TO
potted cue
1220 IF x=2 AND y=30 THEN GO TO
potted cue
1225 IF x=2 AND y=15 THEN GO TO
potted cue
1230 GO TO 470
1250 PRINT AT 1,1: PAPER 5: INK
0:"Potted Cue":AT 3,3, PAPER 5:
INK 0:"Ball"
1270 RESTORE 1275 FOR n=0 TO 35
READ a,b: BEEP .4,b+12: NEXT n
1275 DATA 1,1,2,3,5,3,5,2,1,0,
1,0,1,2,1,0,1,5,2,0,1,3,1,5,0,
5,5,5,5,5,5,7,7,7,7,7,7,7,7,
7,7,5,5,5,5,5,5,2,1,0,1,0,1,0,
1,0,1,0,1,0,5,2,0
1276 PRINT AT 1,1:"
1280 GO TO 1010

```

POL

BY JOHNNATHAN YEOMANS

RUNS ON A SPECTRUM IN 48K



Fancy yourself as a bit of a pool-room hustler? Well, chalk-up your cue and get ready to pot a few balls as your Spectrum sets out to sharpen-up your skills.

The computer sets the balls rolling by playing the break for you. Then you have to attempt to pot the balls by inputting the strength and direction of the cue ball. Once this is done you simply press Return and sit back and watch. Will your shot be on target? The computer keeps score throughout the game and tells you how many balls are left.

The game puts all the colour and sound facilities of the Spectrum to good use — and provides pool players with the ideal way to practice those difficult shots.



For the best hardware, the best software.

The BBC Microcomputer system is generally regarded to be the best micro in its price range you can lay your hands on. So, if you're thinking of buying one or already own one, you'll want to know about the software that's been specially designed for it.

Not surprisingly, it's made by Acornsoft, the software division of Acorn Computers Ltd., who designed and built the BBC Microcomputer. So naturally you can expect the highest quality software with the built-in ingenuity to fully exploit the BBC Micro's potential.

Further education for everyone.

Creative Graphics, which includes the book 'Creative Graphics on the BBC Microcomputer' (price £17.45), provides 36 programs on cassette producing a spectacular range of pictures and patterns in full colour, including animated pictures, recursively-defined curves and three dimensional shapes.

Word Sequencing (price £11.90) contains three word sequencing programs on cassette. Each program presents a series of jumbled words which must be arranged on screen to form

either a proverb, nursery rhyme title or a sensible sentence.

Learn more languages.

LISP (price £24.35) is the fundamental language of artificial intelligence research.

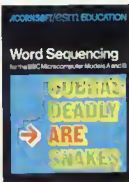


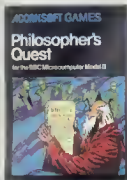
It consists of 5.5k of machine code interpreter, plus 3k of initialised LISP work-space containing utilities and constants. It comes complete with a book that introduces you to programming in LISP, as well as some fascinating applications.

FORTH (price £24.35) is a complete implementation of the FORTH language to the 1979 standard specification for the BBC Microcomputer Model B. This much acclaimed programming language is also accompanied by a specially written book explaining all you need to know.

Mind-boggling games.

Philosopher's Quest (price £9.95) is an advanced adventure in which you tell the computer what you want to do and it





describes back in plain English your progress through a fascinating world of fiendish puzzles to be solved.

Snapper (price £9.95) is a colourful game where you guide your 'snapper' through the maze, eating dots and fruit and avoiding the creatures that chase you. Complete with full sound effects, score and a ladder of high scores.

Rocket Raid (price £9.95) sends you on a mission to raid a heavily guarded Martian fuel depot. You must fly your rocket over mountains and through caverns, avoiding enemy missiles and dodging convoys of deadly fizzlers.

Increase your business acumen.

Desk Diary (price £9.95) is an indispensable program that can hold a file of several hundred names, addresses and telephone numbers.

And View, a program that enables your machine, together with a printer, to operate as a fully operational word processor. (The program is in ROM, but can easily be fitted to most BBC Micros by your local dealer.) You can find out

more by sending for our free catalogue.

How to get Acornsoft programs.

If you're a credit card holder and would like to buy cassettes of the programs shown in this advertisement, or if you would like to know the address of

your nearest stockist, just phone 01-200 0200.

Alternatively, you can buy the cassettes

directly by sending off the order form below to: Acornsoft, c/o Vector Marketing, Denington Estate, Wellingborough, Northants NN8 2RL. Also use this form if you would like to receive the current free Acornsoft catalogue.

Please allow 28 days for delivery.



☒ Credit Card Holders, Ring 01-200 0200.

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LIST	£24.35			(S400/02/S400/03)
FORTE	£24.35			(S400/11/S400/13)
Philosophers Quest	£9.95			(S100/01)
Snapper	£9.95			(S100/04)
Rocket Raid	£9.95			(S100/05)
Desk Diary	£9.95			(S100/10)

TOTAL

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ACORNSOFT

BY NICK ALEXANDER

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RUNS ON A VIDEO GENIE

OR TRS-80 LEVEL II IN 16K

This version contains a sound routine that is poked into memory and coverted to machine language.

There is no need to protect any memory when you run the game as I have used 16478 onwards which is not used by the interpreter after power up. This saves memory as this location resides within the part of memory that is normally saved by the Basic Interpreter.

A point to note is that any short language subroutine can be poked here.

If you don't require a round delete lines 1515 through to 1519 then delete all the `V = USB()` calls.

To use this sound routine you must have the Video Genie conversion kit installed or through the external cassette socket by taking the plug which normally fits into the auxiliary socket of the recorder and reconnecting it to an external amplifier. Tandy TRS 80 users should have no problem.

```

10 CLS
20 CL:GOTO500
30 GOSUB9000
40 OF=H:IFX=H:THENOF=C$
50 V=V+V*H:GOTO200
60 V=V+V*G:GOTO200
70 V=V+V*I:GOTO200
80 V=V+V*J:GOTO200
90 V=V*V:GOTO200
100 GOTO100
110 IFV=0:GOTO100
120 IFV=1:GOTO100
130 IFV=2:GOTO100
140 IFV=3:GOTO100
150 IFV=4:GOTO100
160 IFV=5:GOTO100
170 IFV=6:GOTO100
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200 IFV=9:GOTO100
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250 IFV=14:GOTO100
260 IFV=15:GOTO100
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2540 IFV=243:GOTO100
2550 IFV=244:GOTO100

```

CONNECT 4

[illegible]



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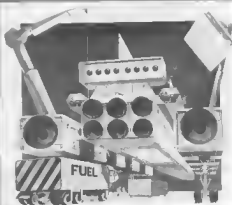
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were really flying! But then YOU ARE! The Enemy Saucers
well actually zoom towards you in 3D, and shoot you if you let them! Your Saucers
which shows your roaring home planet backdrop of Stars Meteors Explosions
Plasma Beams your Photon Beams up to 4 Enemy Saucers and all course in all
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Program notes:

Lines 2500-2580: Contain a dummy string GRS and the spaces between the quotation marks must add up to 64. This short routine is used to convert the dummy string and fill it with graphic characters that are then used to `PRINT@`; rather than `poke` or `set`, and is for quick-er.

Also, no `CLEAR` statement is required for this string and does not need to be taken into account at the beginning of the programme.

Control: if you want to ex-

periment with the computer's game try changing the first six values in line 1555. Lines 1560-1565 contain the graphic strings for human player and the computer. `CMS (30)` clears the print line instead of using `PRINT@ XX, string(x,"")`, which seems a rather long-winded way of doing things.

The computer takes anything from 10 secs to 1 min to think about its moves, especially at the beginning of the game because it has to calculate each position in the 63 (8,8) array.

```

5120 PRINT@960;"SORRY ** ILLEGAL INPUT.";USP(3200);FOR I=IT0400:NEXT I;GOTO5060
5130 R=P(Y)*IFP(7)THEN5110
5131 U=USP(3100)
5140 P=X*P(1)*P(6)+1165*R/2+H3CR=BC(R,Y)*GOSUB 9000
5150 Y=H31;GOSUB60
5160 FOR I=IT041 IFR(D)*4 THEN GOTO5190ELSE4
5170 FOR I=IT051PRINT@960;" " 0,3 YOU MIN " " 1;1=USP(1200)
5180 FOR J=IT0100NEXT J 1;2=USP(25476)+FOR J=IT0100
5190 J=J+1
5191 GOTO10000
5192 NE TD
5193 *COMPUTED MOVE
5200 FOR I=IT0100PRINT@960;CHR(30);:PRINT@960;"THIS ISG "1;1=USP(12456)
5210 Q=J+1
5220 FOR P=IT061R=P(P)+1
5230 IFR(8)THEN 6181
5240 E=1;Y=C;F=8;X=P
5245 GOTO5060
5250 P=L=IT041;L=L+1;NE TL
5260 FOR I=IT041WHILE I>1;IF F=3 I=4;GOTO7010
5270 Q=Q+1;:IF Q 4 THEN 6090
5280 E=E+1;A=J+1
5290 NE TI
5300 C=P(1)+IT041+J(1)+1;IF U=3 THEN 6130
5310 C=Q+P+45;GOTO5060
5320 E=E+3;C=U+G(C)+F+1
5330 NE TI
5340 IF P=1 THEN 6155
5350 F=1;P=H31;GOTO5060
5360 P=H31 IFR 8 THEN 6170
5370 GOSUB60
5380 FOR I=IT041 IFR(I) 3 THEN E=2;NEXT I
5390 IFR 8 THEN 6181
5391 IFR 8 THEN I=IT06100
5395 Q=Q+1;IF Q=4; 1/0 THEN 6181
5400 U=H3P=6
5410 NE TP
5415 IF P=8 THEN 6200 ELSE PRINT@960;CHR(30);
5420 PRINT@960;"** ITS A DRAW **";1=USP(23193);FOR I=IT01000NEXT I
5430 GOTO 10000
5440 Y=C
5450 PRINT@960;CHR(30);
5460 PRINT@960;"I AM GOING IN COLUMN "1;X;1=USP(6812)
5470 FOR I=IT01000NEXT I
5480 R=P(X)+IFR(X)*P(X)+1
5490 G/P;Y=C
5500 Y=C
5510 CR=6;C=P(X)*GOSUB9000
5520 GOSUB60
5530 FOR I=IT041 IFR(I) 4 THEN NE TI :GOTO5060
5540 I=4
5550 PRINT@960;CHR(30);
5560 FOR I=IT061PRINT@960;" " SORPV 1 MIN "1;1=USP(8618)
5570 FOR J=IT0200NEXT J
5580 PRINT@960;" " " " "1;1=USP(31440);FOR I=IT0200NEXT J; I
5590 NE TI
5600 IFR(8;R,X)H THEN F=H
5610 IFR(8;R,X)C THEN F=C
5620 PRINT@C;F;:IF F=H THEN USP(256470)+150;ELSE USP(256410)+120)
5630 RETURN
10000 PRINT@960;CHR(30);
10010 PRINT@960;"DO YOU WANT TO PLAY AGAIN ?"
10020 IN$=IN$E
10030 IF IN$="Y" THEN GOTO10020
10040 IF IN$="N" THEN 1=USP(8900);END
10050 1=USP(7000);1=USP(32000);RUN

```

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LISTING 1

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10 REM DOCTOR WHO ADVENTURE
   INSTRUCTIONS
20 DATA 28,8,28,62,93,28,20,20
30 DATA 0,0,0,224,191,226,5,0
40 DATA 0,0,0,64,255,64,0,0
50 DATA 0,0,0,64,160,64,0,0
60 DATA 0,0,0,224,160,224,16,0
70 DATA 0,0,64,112,128,0,0,0
80 DATA 0,0,32,80,248,0,0,0
90 DATA 8,8,93,67,28,28,20,20
100 DATA 0,224,32,32,38,36,36,60
110 DATA 0,0,64,196,60,60,60,60
120 DATA 0,127,127,127,0,247,247,247
130 DATA 192,216,216,216,24,216,216,216
140 DATA 3,27,27,27,24,27,27,27
150 DATA 255,255,255,255,255,255,255,255
160 DATA 3,6,12,24,48,96,192,128
170 DATA 126,98,102,106,114,98,98,126
180 DATA 24,56,24,24,24,24,60,126
190 DATA 126,98,6,60,96,96,102,126
200 DATA 126,102,6,28,6,6,102,126
210 DATA 124,100,100,100,126,12,12,12
220 DATA 126,64,64,124,6,102,102,60
230 DATA 60,102,96,124,102,102,102,60
240 DATA 126,98,98,12,24,24,24,24
250 DATA 60,102,102,60,102,102,102,60
260 DATA 62,98,98,98,62,6,6,6

```

```

270 DATA 240,240,240,240,240,240,240,240
280 DATA 15,15,15,15,15,15,15,15
290 DATA 24,60,126,126,60,60,126,126
300 DATA 0,0,126,0,0,126,0,0
310 DATA 96,48,24,12,24,48,96,0
320 DATA 126,102,6,30,24,24,0,24
330 DATA 60,98,165,195,165,165,96,60
340 DATA 0,60,102,102,126,102,102,0
350 DATA 0,124,102,124,102,102,124,0
360 DATA 0,60,102,96,96,102,60,0
370 DATA 0,124,54,50,50,54,124,0
380 DATA 0,126,96,120,96,102,126,0
390 DATA 0,126,54,48,124,48,48,0
400 DATA 0,62,102,96,110,98,60,0
410 DATA 0,102,102,126,102,102,102,0
420 DATA 0,126,24,24,24,24,126,0
430 DATA 0,126,12,12,76,108,56,0
440 DATA 0,102,108,120,108,102,102,0
450 DATA 0,48,48,48,48,114,126,0
460 DATA 0,99,119,127,107,99,99,0
470 DATA 0,102,118,126,110,102,102,0
480 DATA 0,60,102,102,102,102,60,0
490 DATA 0,124,54,54,124,48,48,0
500 DATA 0,60,98,98,106,100,58,0
510 DATA 0,124,54,54,124,54,54,0
520 DATA 0,62,96,60,6,102,60,0
530 DATA 0,126,90,24,24,24,24,0
540 DATA 0,102,102,102,102,102,60,0
550 DATA 0,102,102,102,102,52,24,0
560 DATA 0,98,98,106,126,118,102,0
570 DATA 0,102,102,28,56,102,102,0
580 DATA 0,102,102,62,6,102,60,0
590 DATA 0,126,12,24,48,102,126,0
600 DATA 0,112,96,96,96,96,112,0
610 DATA 192,96,48,24,12,6,3,1
620 DATA 0,30,6,6,6,6,30,0
630 DATA 60,126,255,255,255,255,255,255
640 DATA 0,0,3,60,192,0,0,0
900 FOR T=0 TO 503:READ A:POKE 14856+T,A
NEXT T
1000 GRAPHICS 17:POKE 756,58:POKE 708,20
POKE 709,198:POKE 710,148:POKE 711,55:P
OKE 712,26:POKE 752,1
1010 ? #6;"? #6;"+++++++DocT
Or who adventure+++++++
1020 ? #6;"? #6;"CHR$(129)"+++++DOCTOR
,i-"
1030 ? #6;"? #6;"N-"CHR$(2)"+++++++KEY,N
-"
1040 ? #6;"? #6;"S-"CHR$(3)"+++++++SWORD,S
-"
1050 ? #6;"? #6;"t-"CHR$(4)"+++++++RING,t
-"
1060 ? #6;"? #6;"r-"CHR$(5)"+++++++ROPE,r
-"
1070 ? #6;"? #6;"U-"CHR$(6)"+++++++RAY GUN,U
-"
1080 ? #6;"? #6;"C-"CHR$(7)"+++++++TIME DAIVE,C
-"
1090 ? #6;"? #6;"t-"CHR$(60)"+++++++MUMMY CASE,
t-"
1100 ? #6;"? #6;"i-"CHR$(40)"+++++++MUMMY,
i-"
1110 ? #6;"? #6;"O-"CHR$(137)"+++++++SNAKE
,O-"
1120 ? #6;"? #6;"N-"CHR$(42)"+++++++SPHINX,
N-"
1130 ? #6;"? #6;"s-"CHR$(161)"+++++++MASTER
,s-"
1140 ? #6;"? #6;"+++++++By jERemy
BugBentVie!"
1150 ? #6;"? #6;"+++++++Loading M
Ain PROGRAM+++++++
2000 POKE 764,12:CLOAD

```


Dr Who Adventure

BY JEREMY GUGGENHEIM

Another time, another place the Doctor is on the move again and this time you can become one of his travelling companions.

This graphics adventure is based on the classic sci-fi TV series Dr Who. In it the good Doctor is trapped on the planet Skaro IV in a pyramid built by his arch enemy, the Master.

The Master plans to destroy the planet — and the Doctor — with a time bomb. He has stolen the Doctor's time drive unit from the Tardis — and without this the Doctor cannot escape the doomed planet. He must get it back — but he can only do this by killing the Master.

You take the role of the Doctor — everything else is controlled by the computer. There are 12 rooms within the pyramid which you must explore in your attempt to escape.

Some of the rooms contain things you will need to escape — some contain hazards which you must overcome.

Objects you need are hidden in mummy cases — but be careful, some of the cases contain angry mummies who do not want to be disturbed! The position of mummies and mummy cases differs each time you play the game.

You can drop an object you are carrying in an empty room by pressing the fire button on the joystick which you also use to control your movements. These objects are replaced in mummy cases when you leave the room.

The time left before the bomb explodes and the number of the room you are in are shown at the bottom of the screen.

Objects you will need in your escape bid are the key to the Master's Tardis, which is contained in a mummy case somewhere in the pyramid, a sword from the High Priest's temple which will protect you against snakes and the Sphinx, a magic ring, which protects you against any stray thunderbolts, a rope,

which will come in useful if you fall into any pits, a ray gun, which you will find in a pit, and your time drive which is in the Master's Tardis.

Deadly dangers which you must avoid or defeat if you are to survive include mummies and snakes. And don't leave the key in the Master's Tardis — you'll never get back in!

LOADING AND CLOADING

Because this program includes instructions which are

shown while the other program is loading the loading and saving procedures are slightly different from normal. To load the program type **RUN C** (and press RETURN).

The program will load and when ready will say "READY". You should then type **RUN** and the program will run.

To save the instruction program either load it off the tape by typing **CLOAD** instead of **RUN C** and when it is ready

type **SAVE C**, or write out the listing and type **SAVE C**.

When the instructions have been saved using **SAVE C** you can save the main program. You do this by either writing out the listing of loading the program from tape and then, **DIRECTLY** after the instruction program, you **SAVE** the program in the normal way.

Now, when you **RUN C** the instruction program, the program will immediately run without having to type anything. Then line 2000 tells the computer to load the main program will still keep the instructions on the screen.

There are two main advantages of having the two different programs. The first is that the instructions can be read in plenty of time while you are waiting for the main program to load.

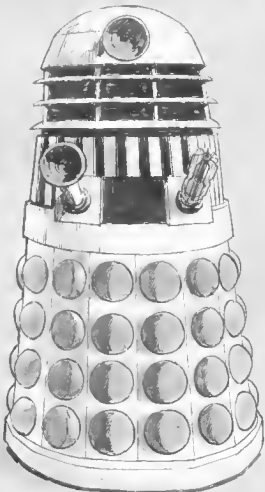
The second is that this method saves about 8 K of memory and a lot of time. This is because it creates a whole new custom character set before printing the instructions. The new set is kept in memory while you load the new program (even **NEW** does not affect it).

The memory used for the character set and instructions is cleared when the other program loads but the character set stays intact. Also the immensely tedious time it takes to build a new set is forgotten as this is done automatically when the instructions load.

However, there is a problem with the program, and this is that after 15-50 games (depending on their length) the character generation starts to get over-written by RAM.

This seems impossible to solve. There may be a way but I do not know one perhaps someone out there can solve it?

The character set RAM is held as high up in memory as I can get it without upsetting the Display List. The only thing to do when this happens is to re-load the whole program.



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Wizard	21.95		Dr. Doom 57	17.95	
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LISTING 2

```

5 CLR
10 DIM R(12),D(12),X(15),Y(15)
56 DATA 110,0,1110,0,1010,0,1000,1,101,5
,111,0,1110
60 DATA 0,1000,4,1,2,1,7,11,6,1000,8,1,1
,1,-1,1,0,0,0,-1,1,-1,-1,-1,0,0,0,0,1,0,
-1,0,0
80 FOR N=1 TO 12:READ A,B:D(N)=A:R(N)=B:
NEXT N:FOR N=5 TO 15:READ A,B:X(N)=A:Y(N)=
B:NEXT N
90 TL=30:X=7:Y=16:YR=4:D=0:SN=1:SL=1:P1=
1:MT=0:FOR T=1 TO 4:GOSUB 95:READ A:R(1)
=A:NEXT T:GOTO 300
95 I=INT(RND(0)*7)+1:IF R(1)=0 THEN RETU
RN
96 GOTO 95:DATA 10,11,14,15
100 POSITION 0,22: ? #6:"doctor who adven
ture   TIME LEFT=":RETURN
105 POSITION 19,22: ? #6:"   TIME LEFT=":
RETURN
110 IF A AND Y=0 THEN YR=YR-1:Y=20:GOTO
300
120 IF B AND X=18 THEN YR=YR+4:X=1:GOTO
300
130 IF C AND Y=21 THEN YR=YR+1:Y=1:GOTO
300
140 IF D AND X=0 THEN YR=YR-4:X=17:GOTO
300
150 RETURN
160 TL=TL-0.01:POSITION 13,23: ? #6:TL:"
":IF TL=INT(TL) THEN TL=TL-0.4:IF TL<0.0
1 THEN 8000
170 RETURN
180 POSITION X,Y: ? #6:CHR$(129):IF D TH
EN ? #6:CHR$(0+1)
190 GOSUB 160:XX=0:YY=0:Z=STICK(0):IF Z<
15 THEN XX=X(Z):YY=Y(Z)
200 LOCATE X+XX,Y+YY,L:IF L>42 AND L<47
THEN XX=X:YY=Y
210 LOCATE X+XX+1,Y+YY,L:IF L>42 AND L<4
7 THEN XX=X:YY=Y
220 POSITION X,Y: ? #6:"   X=X+XX:Y=Y+YY
":RETURN
300 GRAPHICS 17:POKE 752,1:POKE 712,26:P
OKE 708,19:POKE 709,199:POKE 710,148:POK
E 711,55:POKE 756,58
310 COLOR 43:PLOT 0,0:DRAWTO 19,0:PLOT 0
,21:DRAWTO 19,21:COLOR 44:PLOT 0,1:DRAWT
O 0,20:COLOR 45:PLOT 19,1
320 DRAWTO 19,20:D=0:(YR)=R(YR):COLOR 0
330 IF D/1000>1 THEN A=1:PLOT 7,0:DRAWT
O 11,0:D=D-1000
340 IF D/100>1 THEN B=1:PLOT 19,8:DRAWT
O 19,12:D=D-100
350 IF D/10>1 THEN C=1:PLOT 7,21:DRAWTO
19,21:D=D-11
360 IF D THEN PLOT 0,8:DRAWTO 0,12
370 IF R THEN GOSUB (R*200)+300
380 GOSUB 100
390 GOSUB 180:GOSUB 110:IF STRIG(0) OR 0
=0 THEN 390
410 SOUND 0,100,10,4:R(YR)=0+7:POSITION
X+1,Y-1: ? #6:CHR$(0+1):D=0:SOUND 0,0,0,0
:GOTO 390
500 FOR W=6 TO 13:POSITION 8,W: ? #6:"!:"
":NEXT W:POSITION 8,6: ? #6:"!:"":POSITIO
N 8,14: ? #6:"!:""
510 COLOR 254:PLOT 9,5:POSITION 4,22: ? #
6:"your tardis":GOSUB 105
520 GOSUB 180:GOSUB 110:IF L>174 THEN 5
20
570 GOSUB 580: ? #6:"your control room":G

```

```

OSUB 105:X=9:Y=20:GOTO 600
580 ? #6:CHR$(125):COLOR 46:PLOT 0,0:ORA
WTO 19,0:DRAWTO 19,21:DRAWTO 11,21:PLOT
7,21:DRAWTO 0,21:DRAWTO 0,0
590 POSITION 8,10: ? #6:"/.\"":POSITION 8,
11: ? #6:"\".\"":POSITION 8,12: ? #6:"\".\":P
OSITION 0,22:RETURN
600 GOSUB 180:IF STRIG(0)=0 THEN 670
610 IF Y<21 THEN 600
660 X=9:Y=16:GOTO 300
670 IF 0<Y THEN POSITION 0,22: ? #6:"can
t drop that here":FOR N=1 TO 500:NEXT N:
GOTO 570
680 FOR N=255 TO 0 STEP -3:POKE 708,N:PO
KE 712,255-N:POKE 709,RND(0)*N:SOUND 0,N
,10,5:SOUND 1,255-N,10,3
690 NEXT N:SOUND 1,0,0,0:POSITION 5,13: ?
#6:"score   TL=100:GOTO 8020
700 FOR W=7 TO 14:POSITION 9,W: ? #6:"."
":NEXT W:POSITION 8,15: ? #6:"!:"":POSITION
8,6
710 ? #6:"!:"":POSITION 0,22: ? #6:"maste
rs tardis":GOSUB 105
720 GOSUB 180:GOSUB 110:IF L<46 THEN 72
0
725 IF MT=0 AND D<1 THEN POSITION 0,22:
 ? #6:"need a key to get in":FOR N=1 TO 5
00:NEXT N:Y=16:GOTO 300
730 GOSUB 580: ? #6:"masters control room
":GOSUB 105:X=9:Y=20:D=0:TL=W=10
740 POSITION X,Y: ? #6:CHR$(129):POSITION
0,W: ? #6:CHR$(161):IF 0 THEN POSITION X
+1,Y: ? #6:CHR$(0+1)
750 GOSUB 160:QD=(X*0)-(X*0):WW=(Y*W)-(Y
*W):XX=0:YY=0:Z=STICK(0):IF Z<15 THEN XX
=X(Z):YY=Y(Z)
760 LOCATE X+XX,Y+YY,L:IF L>42 AND L<47
THEN XX=X:YY=Y
770 LOCATE X+XX+1,Y+YY,L:IF L>42 AND L<4
7 THEN XX=X:YY=Y
780 LOCATE 0,QD,W+WW,L:IF L=129 THEN 850
790 IF L=6 THEN 820
795 IF STRIG(0)=0 AND D=1 THEN MT=1:D=0:
POSITION X+1,Y-1: ? #6:CHR$(2)
800 POSITION X,Y: ? #6:"   ":POSITION 0,W:
 ? #6:"   X=X+XX:Y=Y+YY:D=0+QD:WW=W+WW:IF
Y<21 THEN 740
810 X=9:Y=17:GOTO 300
820 FOR T=1 TO 3:FOR N=255 TO 0 STEP -10
:POKE 712,N:SOUND 0,N,10,5:NEXT N:NEXT T
:D=6:POSITION 0,W: ? #6:""
830 SOUND 0,0,0,0:POKE 712,26:POSITION 0
,21: ? #6:"master is dead you have the t
ime drive"
840 FOR N=0 TO 1000:NEXT N:R(YR)=0:GOTO
100
850 POSITION 0,22: ? #6:" he has killed y
ou":GOTO 8000
1100 POKE 712,61: ? #6:CHR$(125):W=0:COLOR
46:FOR Q=5 TO 21:PLOT 0,Q:DRAWTO W,Q:PL
OT 19,0:DRAWTO 19-W,Q:X=9
1110 W=W+(Q-5)/8:NEXT Q:POKE 710,10:POSI
TION 3,22: ? #6:"a pit":GOSUB 105:IF 0=4
THEN R=0
1120 FOR Y=0 TO 17:POSITION X,Y: ? #6:CHR
$(129):IF 0 THEN ? #6:CHR$(0+1)
1130 SOUND 0,Y=15,10,4:GOSUB 160:FOR T=1
TO 10:NEXT T
1140 POSITION X,Y: ? #6:"   ":IF P=0 THEN
POSITION X,Y: ? #6:CHR$(186)
1150 NEXT Y:POSITION 0,22: ? #6:"a ray gu
n":SOUND 0,0,0,0:FOR T=1 TO 500:NEXT T

```

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The Green, Tadley, Hants

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V.I.C. 20

```

1160 POSITION 0,22:IF PI THEN ? #6;"you
are trapped":GOTO 8000
1170 ? #6;"cIiab up the rope":0=5:FOR Y=
17 TO 0 STEP -1:POSITION X,Y: ? #6;CHR$(1
29):CHR$(6)
1180 GOSUB 160:SOUND 0,Y=15,10,4:FOR T=1
TO 10:NEXT T:POSITION X,Y: ? #6;" " :NEX
T Y:Y=20:YR=7:GOTO 300
1300 ? #6;CHR$(125):POKE 712,194:COLOR 4
6:PLOT 0,21:DRANTO 19,21:FOR T=0 TO 3:PL
OT 0,T+17:DRANTO T,T+17
1310 PLOT 19,T+17:DRANTO 19-T,T+17:NEXT
T:POSITION 5,22: ? #6;"a snake pit":GOSUB
105
1320 M=4:M=M+(X>5)*10:X=M:0=15
1330 POSITION X,20: ? #6;CHR$(129):IF 0
THEN ? #6;CHR$(0+1)
1335 IF SL THEN POSITION 0,20: ? #6;CHR$(
137):00=(X>0)-(X<0)
1340 GOSUB 160:XX=0:Z=STICK(0):IF Z<15 T
HEN XX=X(Z)
1350 IF X+XX=3 OR X+XX=15 THEN 1400
1360 IF SL THEN LOCATE 0+00,20,L:IF L=12
9 THEN POSITION 2,22: ? #6;"the snake bit
you":GOTO 8000
1370 IF SL AND L=3 THEN 1450
1380 POSITION X,20: ? #6;" " :X=X+XX:IF S
L THEN POSITION 0,20: ? #6;" " :0=0+00
1390 FOR T=1 TO 50:NEXT T:GOTO 1330
1400 FOR Y=20 TO 16 STEP -1:POSITION X,Y
: ? #6;CHR$(129):IF 0 THEN ? #6;CHR$(0
+1)
1410 SOUND 0,Y=10,10,4:FOR T=1 TO 40:NEX
T T:SOUND 0,0,0,0:POSITION X,Y: ? #6;" "
:X=X+XX:NEXT Y
1420 Y=Y:YR=YR-(X<5)*4+(X>15)*4:M=(X<5)*
17+(X>15)*1:X=M:GOTO 300
1450 SL=0:POSITION 0,22: ? #6;"you killed
the snake":FOR T=100 TO 200:SOUND 0,T,1
0,4:NEXT T:SOUND 0,0,0,0
1460 POSITION 0,20: ? #6;" " :GOTO 1380
1500 IF SN=0 THEN 300
1510 Q=INT(RND(0)*8)+10:W=INT(RND(0)*15)
+2:POSITION 0,22: ? #6;"a sphinx":GOSUB 1
05
1520 POSITION 0,N: ? #6;CHR$(42):POSITION
X,Y: ? #6;CHR$(129):IF 0 THEN ? #6;CHR$(
0+1)
1530 Q0=(Q<X)-(Q>X):NN=(N<Y)-(N>Y):XX=0:
YY=0:Z=STICK(0):IF Z<15 THEN XX=X(Z):YY=
Y(Z)
1540 LOCATE 0+00,W+WN,L:IF L=129 THEN 16
00
1550 GOSUB 110:GOSUB 160:IF L=3 THEN 165
0
1560 LOCATE X+XX,Y+YY,L:IF L>42 AND L<46
THEN XX=0:YY=0
1570 LOCATE X+XX+1,Y+YY,L:IF L>42 AND L<
46 THEN XX=0:YY=0
1580 POSITION 0,N: ? #6;" " :Q=0+00:N=N+WN
:POSITION X,Y: ? #6;" " :X=X+XX:Y=Y+YY:GO
TO 1520
1600 POSITION 0,22: ? #6;"the sphinx got
you":GOTO 8000
1650 SN=0:POSITION 0,22: ? #6;"the sphinx
is dead":FOR T=100 TO 200:SOUND 0,T,10,
4:NEXT T:SOUND 0,0,0,0
1660 FOR T=0 TO 300:NEXT T:GOTO 300
1700 COLOR 43:PLOT 12,17:DRANTO 16,17:PL
OT 11,18:DRANTO 17,18:COLOR 163:PLOT 10,
17
1710 COLOR 168:PLOT 14,16:POSITION 0,22:
 ? #6;"high priest s temple":GOSUB 105:0=

```

```

15:W=16
1720 POSITION X,Y: ? #6;CHR$(129):IF 0 T
HEN ? #6;CHR$(0+1)
1730 POSITION 0,N: ? #6;CHR$(95):XX=0:YY=
0:Z=STICK(0):IF Z<15 THEN XX=X(Z):YY=Y(Z
)
1740 GOSUB 110:GOSUB 160:LOCATE 0-1,W,L:
IF L=129 THEN 1800
1745 IF X=9 AND Y=17 THEN 0=2:POSITION 0
,22: ? #6;"you have the sword "
1760 LOCATE X+XX,Y+YY,L:IF L>42 AND L<46
THEN XX=0:YY=0
1770 LOCATE X+XX+1,Y+YY,L:IF L>42 AND L<
46 THEN XX=0:YY=0
1780 POSITION X,Y: ? #6;" " :POSITION 0,W
+ ? #6;" " :X=X+XX:Y=Y+YY:Q=0-1:IF Q>0 THE
N 1720
1790 0=9:W=W:GOTO 1720
1800 POSITION 0,22: ? #6;"a lightning bol
t hit you":IF Q<3 THEN 8000
1810 SOUND 0,200,10,4:FOR T=1 TO 300:NEX
T T:POSITION 0,22: ? #6;"the ring saved y
ou " :SOUND 0,0,0,0
1820 FOR T=1 TO 300:NEXT T:GOTO 300
1900 GOSUB 1910: ? #6;"master s tardis ke
y":GOTO 390
1910 POSITION 9,9: ? #6;"<":POSITION 0,22
: ? #6;"a mummy case":GOSUB 105
1920 GOSUB 180:GOSUB 110:IF X<8 DR Y<9
THEN 1910
1930 IF R=14 OR R=15 THEN 1950
1940 V=0:0=R(YR)-7:R(YR)=V+7-(V=0)*7:POS
ITION X,Y: ? #6;" " :Y=Y-1:POSITION 0,22:
GOSUB 3000:RETURN
1950 POSITION 8,22: ? #6;" " :0=11:W=11
1960 POSITION 0,W: ? #6;CHR$(40):POSITION
X,Y: ? #6;CHR$(129):IF 0 THEN ? #6;CHR$(
0+1)
1970 GOSUB 110:GOSUB 160:Z=STICK(0):Q0=(
Q<X)-(Q>X):NN=(N<Y)-(N>Y):XX=0:YY=0:IF Z
<15 THEN XX=X(Z):YY=Y(Z)
1980 LOCATE X+XX,Y+YY,L:IF L>42 AND L<46
THEN XX=0:YY=0
1990 IF X=0 AND Y=W THEN POSITION 0,22: ?
#6;"the mummy got you":GOTO 8000
2000 LOCATE X+XX+1,Y+YY,L:IF L>42 AND L<
46 THEN XX=0:YY=0
2010 POSITION 0,N: ? #6;" " :0=0+00:W=W+NN
:POSITION X,Y: ? #6;" " :X=X+XX:Y=Y+YY:GO
TO 1960
2100 GOSUB 1910: ? #6;"a sword":GOTO 390
2300 GOSUB 1910: ? #6;"a magic ring":GOTO
390
2500 GOSUB 1910: ? #6;"some rope":GOTO 39
0
2700 GOSUB 1910: ? #6;"a ray gun":GOTO 39
0
2900 GOSUB 1910: ? #6;"the time drive":GOTO
390
3000 ? #6;" " :POSITION
N 0,22:RETURN
3100 GOTO 1910
3300 GOTO 1910
8000 COLOR 43:FOR W=21 TO 0 STEP -1:FOR
0=0 TO 19:SOUND 0,255,10,4:PLOT 0,W:SOUN
D 0,0,0,0:NEXT 0:NEXT W
8010 POSITION 5,5: ? #6;"you lose " : ? #6
;"the master will rule++ the universe +
+":GOSUB 100
8020 POSITION 0,21: ? #6;"press START to
begin":IF PEEK(53279)<6 THEN 8020
8030 RESTORE 56:R(1)=0:R(2)=0:R(6)=0:R(7
)=0:RUN

```

```

OREM *****
1REM * SKIING *
2REM * S.J. HARRIS *
3REM *****
6REM NEEDS AN ATOM WITH 5K PROGRAM AND 3K SCREEN MEMORY
9P,521
100TMLL10,SS10,PP20,0020,832,C32,4-1,5S2=-1,F,X=1T02 D1NP-1
190EM CHARACTER PLOT
20RSLA/ASLA,ASLA,TAK,LDY00,LL0DAE2800,X,EDRE89,STAF E8B),Y
211NK,TYR CLC,ADD016,TAY CMP0125,BNELL0,RTS
C6=SCROLL SCREEN
27 LL2LD0AE81,STAE81,LD00,STAE50,LL1LDY0128,LD0AE80),Y,LDY00
28STA'E80),Y,INC80,BNELL1,INCE81,LD0E81,CMP0E0C,BNELL1 RTS
29 LL10LDX00,LL3LD0E,X,STAC,X)1NK/CPX016
30BNELL3,RTS,LL9LD0E328,CMP0E55,BNELL4,LD00,STAE328
31STA335 STAE62,STAE89,LL4CMP016,BNELL5,LD0E15,STAE328 LL5RTS
32J,G05,C,L 050LD0E80,STAE80,LD0E80,STAE81,LDY00,STY053
33SS1LD0AE80),Y)CMP0EFD,0NESS2,CY0E328,BMISS DEC03JMPSS2
34 SS3INCE83,SS21NY)CPY016,BNESS1/RTS
35J
36N,F=E2E0,G05,2000P,REM CHARACTERS
37F=E2051010 P14=E2E02020 P12=E2051010 P'12=E20005634
38P116=E20381010,P120=E20283054,P124=E2C1A1000,P128=E4091A2C
39P132=E1F100000,P136=E7F0C040C,P140=E7E7E0E02,P144=E2020232
40P148=E1E101005 P'52=E7E3C0C0C P156=E7F7E7E7E P'10=E101005FF
41E44F,F,A=2T015,X7B=6,X7C=0,N,P164=0 P16E=0
42F,J=1T0D,Q=3,P,512"PLAYER",J,IN,"WHAT IS YOUR NAME ",6FFJ
43CLEARR3,F,X=E810070E8D00S,4,X=-1,N,X'E80=0
44G=6 V=2,'E84=P,'E80=-1
45F,X=76T01455,6 P'X=EFE,N,P172=E8262E2FE,P180=E4040404,P184=4
46P186=E80FE02FE,P196=E2FE02FE,P'104=E2FC8202,P'106=2,P'132=4
47P'112=E2FE807E P'128=E82FE80FE,P'12E=E20202FE,P'136=E82FE82FE
48P'144=E2FE82FE,P'160=0,P'172=E15A9552A,P'176=0,L=0,Q=0,F=5
491160=-1,1164=-1 P'180=E54A85A00,P'184=0,P'188=E54A85A14
50F,A=0T015 X7B=0,1FA7C=6 X79=7
51N,IFA,R,X10=1 Q=A,R,X13 B7Q=21,B7(Q+1)=22,B7(Q+2)=23
52IFA,R,X10=1 B7F=5,B7(F+5)=3,F=F+R,X4,F=(A,F,X10),G,54
53F,X=1TOR,X,X3 T=A,R,X16,T7B=6,N,L1,507
54F,X=0T015 'E20B=X,'E8C=E85 A=X7B,L1,W,N
55A=20,T7B=6,T7E8C=E83,IF'E80011128=0V=y-1 IFV0V=0
56L1,W=IF'E800264=0V=y+1 IFV74V=4
57V=50
581FV40G=G-1,N=35,G05,d,G,56
601FV=1G=G-1

```

SKI-

The air is cold and clear. Below the snow clad mountain lies silent. The slopes slumber in the harsh light of the sun. The obstacle course you must navigate to remain champion is hidden from view by all this deceptive beauty.

Taking a deep breath you thrust yourself forward, determined to smash all existing records. Snow sings beneath your skis as you bob and weave to miss trees and hidden patches of ice. Eyes ache as they strain to pick out the flags you must pass between. Each obstacle hit or flag missed earns you a penalty of five seconds. Can you do it in the time required to retain the crown?

This game written for the IZK Atom includes all the exciting features of the popular arcade game. You can compete with up to sixteen other players. A run down of all the times is given at the end of each competition. During each individual run time readout is displayed at the top right of the screen.

The only controls used are SHIFT for left turns and REPT for right turns.



BY L. ANDERSON

RUNS ON A DRAGON IN 32K

TURBO CAR

Put the pedal to the metal and zoom off on a fast and furious race track native.

This is a version of that addictive arcade game where you control a high powered race car and attempt to dodge traffic coming at you along the track.

The car is controlled by the Dragon's "m" and "n" keys. The longer you survive on the road the more points you earn. The authors high score stands at 639 — can anyone beat it?

Variables—>

H: high score. CR: ASCII code for road background
FF: width of road. DL
difficulty level (1-5). YS: your car. Y: your position
A: position of lead. B: variable to move road left, right or middle

```
10 POKESHFFD: 0
40 CLSE
50 CLR TURBOCAR BY L.ANDERSON
60 REM START
70 LLERR 100
80 HI=000 HI$="KILBURY"
90 L$="3"
100 INPUT SELECT DIFFICULTY(1-5):DL:IF DL<1 OR DL>5 THEN 80 ELSE FF=0-DL*47
110 REM CLR:255+CHR$ 240
120 PLAY 1205L5002 CLS0 Y=15:RND=0:B=1
130 FOR L=1 TO 166
140 LNK=PEEK(L*158)+247-(PEL(L*157)+247)
150 Y=Y+L
160 IF RND<3/4 THEN B=RND*3/2
170 H=H+B
180 L$=L$(L$+(R+FF)) DNR=470
190 I=ASC(STRING$(L$)) D=ASC(STRING$(DNR))
200 IF RND<7/8 THEN B=1 ELSE IF RND<5 THEN B=1
210 IF RND<3/4 THEN PRINT$+RND*FF+1/31,CHR$(RND*310+127)
220 PRINT$+L$+D: PRINT$+STRING$(FF+1,128): PRINT$+FF+1,L$
230 IF PEEK(1824+Y)*128 OR PEEK(1825+Y)*128 THEN 260
240 PRINT$+B: PLAY 10
250 H=H+1:IF H=64 THEN H=1:CR=RND*2*16+120
260 H$=H$+H
270 GOTO 270
280 REM CLR:PRINT$+L$+D:FOR K=1 TO 20: SOUND RND(150)+1 PUKE 1824+Y RND(128)+130 NE
290 PRINT$+STRING$(2,255): PLAY 12040,CR,FF,DL
300 L$=PRINT$+YOU SCORED:L$+PRINT$
310 IF L$=1 THEN GOSUB 200
320 INPUT DO YOU WANT ANOTHER GOV(Y/N):R$ IF LEFT$(R$,1)<>"N" THEN 70 ELSE END
330 PRINT$+PRINT$+YOU HAVE BEATEN THE HIGH SCORE GP:HI WHICH WAS HELD BY HI$
340 HI=H
350 INPUT PLEASE ENTER YOUR NAME:NI$ IF LEN(NI$)>20 THEN 320
360 RETURN
```


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COMPUTER RAM

BY GARY SPURDENS AND HARRISON AINSWORTH

```

1050 POKE OF+PEEK 22001+1,129
1060 POKE OF+PEEK 22001-1,3
1080 POKE OF+PEEK 22001+33,133
1090 POKE OF+PEEK 22001-33,1
1100 LET X=USR 600
1110 PAUSE 10
1120 POKE 16437,255
1130 POKE DF+PEEK 22001+1+33,134
1140 POKE DF+PEEK 22001-1+33,6
1150 POKE DF+PEEK 22001-1+33,6
1160 POKE DF+PEEK 22001+1-33,6
1170 PAUSE 13
1180 POKE 16437,255
1190 POKE OF+PEEK 22001,8
1200 POKE 22000,PEEK 22000-1
1210 PRINT AT 1,21,"L"...PEEK 220
1220 IF PEEK 22000 THEN GOTO 370
1230 REM // END PRINT//
1240 PRINT AT 0,0;M$//
1250 PRINT " " YOU ARE DE
1260 PRINT AT 20,0;" YOU TRAVELL
1270 "USR 22010" NANO-PARSECS"
1280 PAUSE 42000
1290 POKE 16437,255
1300 SCROLL
1310 SCROLL
1320 SCROLL
1330 PRINT AT 20,0;"? ANOTHER GO
1340 PRINT TAB 8;"(Y OR N)"
1350 PAUSE 42000
1360 POKE 16437,255
1370 CLS
1380 GOSUB 0140
1390 IF INKEY$<"N" THEN RUN 130
1400 STOP
1410 REM // INSTRUCTIONS//
1420 BEGIN " " // INSTRUCT
1430 PRINT " "
1440 PRINT " " YOU HAVE GOT TO T
1450 RAVEL THROUGH THE POSITRONS (2)
1460 AS ONE RAYON CAN.
1470 PRINT " " YOU HAVE 4 LIVES.
1480 EACH TIME YOU HIT P POSITRON YO
1490 LOSE A LIFE."
1500 PRINT " " OCCASIONAL, PLUS
1510 SIGMA APPEAR ON THE SCREEN. YOU
1520 MUST TRY TO ZAP THESE WITH YOU
1530 LASER. EVERYTIME YOU HIT ONE Y
1540 UR SCORE IS INCREASED BY 5."
1550 PRINT " " YOUR CURRENT SCOR
1560 E AND YOUR LIVES REMAINING
1570 ARE DISPLAYED AT THE TOP OF THE
1580 SCREEN."
1590 PRINT AT 21,3 -PRESS 4 TO
1600 CONTINUE-
1610 PAUSE 42000
1620 POKE 16437,255
1630 CLS
1640 PRINT "B AND S MOVE YOU A
1650 AND 2000"
1660 PRINT "B AND S FIRE
1670 N=1
1680 LET S=20010
1690 LET M$="0100000022AFB5E5322F"
1700 C22AFB551105001922FB5E5C
1710 FOR N=1 TO 10: M$=C22F 2
1720 POKE S,16+M$(N-1)*2
1730 LET S=S+20
1740 NEXT N
1750 RETURN
1760 SAVE ASTEROID.B

```



One of the lesser known dangers of deepest space is the swarms of Positrons which inhabit the outer reaches of the galaxy. Unlike asteroids in their affect on ship hulls, the Positrons are actually do-gooder super-heroes pursuing their principles with a zeal and doggedness which makes them positively lethal to anything unlucky enough to be in their way. Among their super powers is total invulnerability to lasers, photons, plasmae, beam rays and anything else which a space pilot too distracted to think about fire at them. Old hands on the inter-galactic routes have developed the skill of Positron-bogging to a fine art. These same old hands when in kindly mood will even snatch up boy-scout points by destroying the deadly asteroids from the American way, might be tempted to fire at them. Positron's home planet, which are the only known things that can harm them, is not attending come-as-you-save-the-universe parties, the Daily Planet and trying to impress young ladies whose initials are L.L.

When not attending galactic phone boxes claiming to work for the Alpha Centauri, they act as one man. A stellar ant is in danger of being stepped on in Alpha Centauri, they act around the galaxy thousands find themselves being locked out of telephone boxes and seconds later the Positron Force bites to the older, rushing through space a danger to everything in their way.

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The ZX Spectrum incorporates all the proven features of the ZX81. But its new 16K BASIC ROM dramatically increases your computing power.

You have access to a range of 8 colours for foreground, background and border, together with a sound generator and high-resolution graphics.

You have the facility to support separate data files.

You have a choice of storage capacities (governed by the amount of RAM): 16K of RAM (which you can upgrade later to 48K of RAM) or a massive 48K of RAM.

Yet the price of the Spectrum 16K is an amazing £125! Even the popular 48K version costs only £175!

You may decide to begin with the 16K version. If so, you can still return it later for an upgrade. The cost? Around £80.

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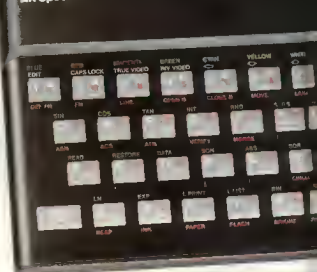
Your ZX Spectrum comes with a mains adaptor and all the necessary leads to connect to most cassette recorders and TVs (colour or black and white).

Employing Sinclair BASIC (now used in over 500,000 computers worldwide) the ZX Spectrum comes complete with two manuals which together represent a detailed course in BASIC programming. Whether you're a beginner or a competent programmer, you'll find them both of immense help. Depending on your computer experience, you'll quickly be moving into the colourful world of ZX Spectrum professional-level computing.

There's no need to stop there. The ZX Printer – available now – is fully compatible with the ZX Spectrum. And later this year there will be Microdrives for massive amounts of extra on-line storage, plus an RS232C/network interface board.



ZX Spectrum



Key features of the Sinclair ZX Spectrum

- Full colour – 8 colours each for foreground, background and border plus fleshing and brightness-intensity control.
- Sound – BEEP command with variable pitch and duration
- Massive RAM – 16K or 48K.
- Full-size moving-key keyboard – all keys at normal typewriter pitch, with repeat facility on each key.
- High-resolution – 256 dots horizontally x 192 vertically, each individually addressable for true high-resolution graphics.
- ASCII character set – with upper- and lower-case characters
- Teletext-compatible – user software can generate 40 characters per line or other settings
- High speed LOAD & SAVE – 16K in 100 seconds via cassette, with VERIFY & MERGE for programs and separate data files
- Sinclair 16K extended BASIC – incorporating unique 'one-touch' keyword entry, syntax check, and report codes

rum



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ZX Expansion Module

This module incorporates the three functions of Microdrive controller, local area network, and RS232 Interface. Connect it to your Spectrum and you can control up to eight Microdrives, communicate with other computers, and drive a wide range of printers.

The potential is enormous, and the module will be available in the early part of 1983 for around £30.

sinclair

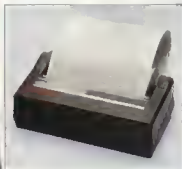
Sinclair Research Ltd, Stanhope Road,
Camberley, Surrey GU15 3PS.
Tel: Camberley (0276) 685311.

The ZX Printer – available now

Designed exclusively for use with the Sinclair ZX range of computers, the printer offers ZX Spectrum owners the full ASCII character set – including lower-case characters and high-resolution graphics.

A special feature is COPY which prints out exactly what is on the whole TV screen without the need for further instructions. Printing speed is 50 characters per second, with 32 characters per line and 9 lines per vertical inch.

The ZX Printer connects to the rear of your ZX Spectrum. A roll of paper (65ft long and 4in wide) is supplied, along with full instructions. Further supplies of paper are available in packs of five rolls.



The ZX Microdrive – coming soon

The new Microdrives, designed especially for the ZX Spectrum, are set to change the face of personal computing by providing mass on-line storage.

Each Microdrive can hold up to 100K bytes using a single interchangeable storage medium.

The transfer rate is 16K bytes per second, with an average access time of 3.5 seconds. And you'll be able to connect up to 8 Microdrives to your Spectrum via the ZX Expansion Module.

A remarkable breakthrough at a remarkable price. The Microdrives will be available in the early part of 1983 for around £50.



How to order your ZX Spectrum

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	Sinclair ZX Spectrum – 48K RAM version	101	175.00	
	Sinclair ZX Printer	27	59.95	
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BY ALLAN SCARFF

In Go, unlike chess, material gains and losses are relatively unimportant when compared with other strategic matters.

Chess reflects the western style of warfare based on direct power and strength. Go is more subtle, resembling guerilla warfare as waged in Vietnam by the Vietcong who used Go in the military training of their officers.

While losing a group of stones may be disastrous, in some situations it can be positively beneficial. A good understanding of the status of each group on the board (or screen) is a prerequisite for making sound strategic decisions. So in this article we shall explore the basics of life and death.

Two or more eyes are alive

Consider the black group marked a in figure 1. Even though the outside intersections are occupied by white, white can never play at points A1 and A3 (these points are examples of eyes) because the rules of Go prohibit more than one move at a time and ban suicide.

The group marked b is more typical of a game situation. Although each eye is comprised of several intersections, allowing white to play inside them, the suicide rule will still prevent the capture of the black group.

One eye or less is dead

Consider the white group in figure 2. It has only one eye and cannot be given another because there is not enough space and the surrounding black group has two eyes and therefore cannot be killed. Note that black should not waste points by playing on the adjacent intersections (marked with x's), white has opponent makes gains elsewhere.

Critical groups

Consider the black group marked a in figure 3. If black gets to play at A2, the

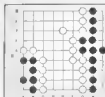


Fig 1 Unconditionally Alive

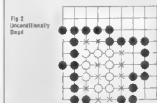


Fig 2 Unconditionally Dead

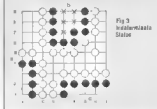


Fig 3 Indeterminate Status

group will live but if white manages to play there first, the group is likely to die.

White can capture the group by continuing to play inside the eye (see the sequence given in figure 4).

If the surrounding white group can be attacked it may be a race to kill or be killed.

However, if white can make his surrounding group unconditionally alive he can remove the one-eyed black group at the end of the game.

It is slightly more difficult to judge the

status of the group marked b. If white plays inside first, can black still make two eyes? The answer is no.

In fact this eye shape is known as the "hatchet five" and it is well known by most Go players that if white plays at the join of the handle to the axe head, the shape will eventually reduce to one eye. Of course if black plays there first he will be safe.

In contrast to the previous two groups, the group marked c, though not yet strictly alive, is almost impossible to kill. Black has two choices as to where to play to form a second eye so he can afford to wait until white has played on one before replying on the other.

When an eye is too big

Consider figure 5. White has enough space to form a one-eyed group of his own inside the black group. The black group is not therefore unconditionally alive but is quite safe because he would have to ignore no fewer than nine moves in order to lose his group.

However, the danger is greater the larger the eye space and the more white stones there are within it. To be absolutely safe the eye space must be a shape that cannot accommodate an opponent group with its own eye.

Counting the eyes

At least to start with, we need to radically simplify the problem to attempt a practical computer solution. One method can be outlined as follows:

- Detect the eye spaces bounded by black stones, ignoring white stones.
- Reject any space which is too big.
- Reject any space not bounded by a single group of connected stones.
- Count the eyes associated with each group.
- Repeat the process for the white stones, ignoring black stones.

Decisions decisions!

Having determined the status of each group — even if only approximately — a whole universe of decision making is opened up.

One simple but large improvement that can be made to our computer program is the suppression of needless moves capturing already dying stones within eyes. But by examining the status of neighbouring groups, quite sophisticated play can be devised.

For instance, a policy of attacking large one-eyed or eyeless groups can be implemented.

But there is no one golden strategy. The best Go programs balance and select between competing strategies. How such programs manage this is another story for another day!



Fig 4 Eye stealing and capture sequence

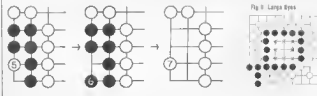


Fig 5 Large Eyes

Projects

MORE THAN A WORD CAN SAY

Welcome to the Projects page where I'll start on the development of projects which you have always wanted to build but have never really got around to.

As with Kit Korner, I will be describing the constructional aspects, paying special attention to the laying out of the circuit. Unlike it, I will be showing you how to use the circuit to full advantage.

There will be far more informative diagrams than in the past, primarily to reduce my volume of typing. After all a picture is worth a thousand words!

TAKING TIME...

To start off with I have chosen the Motorola 6840 programmable timer module around which to design a usable circuit.

We are all preoccupied with time. This design will go some way towards attaining the ideal from your computer.

The programmable timer module, (PTM), has three 16-bit binary counters which are addressed using a normal 8-bit data bus.

How come? I hear you cry. Well, quite simply you store two sets of 8-bits which the chip understands as one 16-bit set.

One of the difficulties to over-

come is the fact that the timer would normally work off the clock of the computer. The 16-bit will be decreased by one on every clock cycle 15-bit equals 64,000, or aroundabout that.

With a 1MHz clock that is only 64 milliseconds. Not very long, eh? To overcome that problem we just substitute a lower frequency clock instead. But more of that next month.

In figure 1, you will see the pin assignment of the chip. The problem in hand is to design a suitable circuit for it, which will serve our requirements.

It must be flexible enough so that there can be further development but also be compact enough to sit inside the popular keyboard size computers.

Fortunately, most of these computers have either an edge connector or another type from which you can take the lines needed for this module.

As there is going to be only the one chip for the minimum circuit I would probably use stripboard. Otherwise I would be tempted to wirewrap on a form of Eurocard and to use up the extra space with other peripherals.

The chip requires a single 5-volt supply which is very convenient of them. The 8 data lines, D-7, are there, of course, as well as two chip select lines.

The "enable" pin is, in fact, the

system clock. Each timer has three separate registers; a decrementing clock, a start trigger, and an output line for indicating that the time has elapsed.

There are three register lines with which to select the data and status registers. The last two lines are reset and interrupt request.

CHIPS AND PINS

In figure 2 I have drawn a brief outline of the chip and to what the pins must be connected. Pins 1 and 14 are obvious. The others may require a little explaining.

The data lines, though, interface directly with those on the main board.

Working in number order around the chip after the ground pin we come to the second timer lines.

Pin 2, the trigger line, or gate line sets counter 2 going as soon as the initialisation is complete.

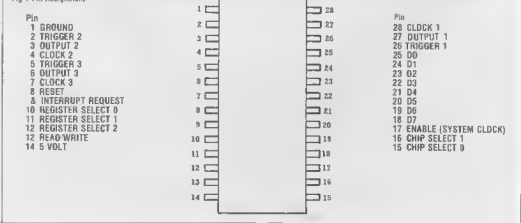
Pin 3, the output line, indicates when the period of timing is over and will drive 2 TTL loads.

Pin 4, the clock input for timer 2 defines the rate at which the binary number loaded into the timer is decremented.

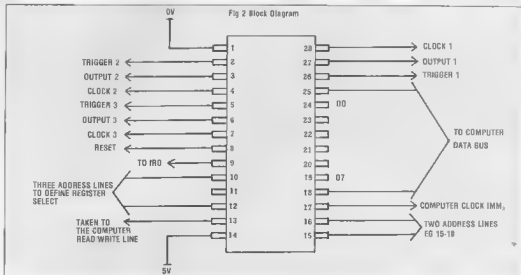
This clock rate can vary up to the 'enable' clock which would normally be 1MHz. For most applications 1kHz would be sufficient and give a maximum count time of about 1 minute.

By using a simple 555 timer chip

Fig 1 Pin Assignment



Projects



or one of the new decimal divider chips almost any frequency can be defined.

Pins 5, 6, 7 and, likewise, 26, 27 and 28 I have explained in the last paragraph.

The reset line, pin 8, does exactly that. It will, whenever activated, reset the counters to their initial values, which are held in on-chip memory.

All that is then required is the triggers and the counters will start off, together, if required. The next pin, pin 9, houses the IRQ line, or interrupt request line

in that block of the 8 registers.

In this respect it works in a similar way to a peripheral interface adapter, PIA.

The read/write line works in exactly the same way as it does in the rest of the system. For reference, the state of any of the registers may be read while the counter is in operation. This can be very helpful when setting up the counters for the first time.

As I have said before, the enable

at pin 17 is the synchronous clock for reading and writing data to and from the counters.

It can, of course, be used for the timers' clock if very short periods are required from the counters.

If you are using a computer with a two phase clock this can be used directly with the counters.

Unfortunately, these days many processors only require a single phase so I will indicate how to derive the correct signal later

OLD ROUTINE . . .

By setting a flag in one of the control registers (to be discussed later) the system interrupt will be activated as soon as any one of the clocks resets at zero.

This will then initialise the micro-processor's interrupt routine which is built into the system.

Pins 10, 11 and 12 define, in system memory where the timer resides, along with pins 15 and 16.

Pins 15 and 16 are the chip select 1 and 0 respectively. CS0 must be at zero and CS1 must be at one for the chip to be addressed.

These two lines define the block in memory and the three register select lines define the location with-



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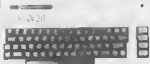
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Graphics

PLAY AROUND WITH PATTERNS

Experimenting with the rules for generating patterns of movement can produce many intriguing displays — and here I aim to set out some of those rules for you to play around with.

The pattern of movement of a point in a plane can be described by giving the position of the point at any time in terms of its initial position and the time.

If the initial position is given by the co-ordinates (XI, YI), and the current position by (XC, YC) then a typical way of giving the position at any time, T, is

$$XC = XI + T \cdot YI$$

$$YC = YI$$

Note that the initial position corresponds to T=0, since this value for T gives

$$XC = XI$$

$$YC = YI$$

That is to say that at T=0 the current position is the same as the initial position.

The rules just given provide only one example of how the current position can be expressed in terms of the current time and the initial position.

Since we can describe the movement of a point in this way we can also deal with the pattern of movement of a flat object by examining how the points that are joined by its edges behave.

Next month we shall examine how solid, three-dimensional objects behave by applying the same idea to its corner points.



Fig 2.

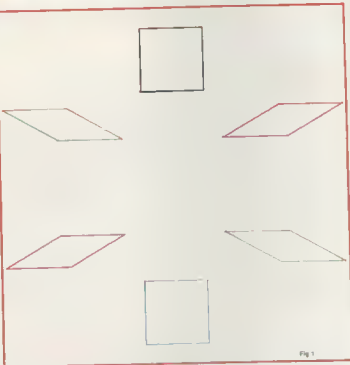


Fig 1

If the way that the time is involved in the equations giving the patterns of movement is periodic, then the resulting pattern of movement will also be periodic.

In other words, the shape will return to its original position after a period of time. It will then repeat its previous cycle of movement again.

This is illustrated in figure 2, which was produced by using the rules

$$XC = XI + YI \cdot \sin(T)$$

$$YC = YI \cdot \cos(T)$$

The following program produces the initial shape of a square and three of its successive positions using the rules for movement given above.

```
10 DIM XI (4), YI (4)
20 FOR I=1 TO 4
30 READ XI (I), YI(I)
40 DATA 1, 1, 1, 5, 5, 5, 5, 1
50 FOR I=1 TO 4
60 T=0.1*(I-1)
70 XX=XI (I) + T*YI(I)
80 YY=YI(I)
90 MOVE XX, YY
100 FOR J=2 TO 4
110 X=XI (J)+T*YI(J)
120 Y=YI(J)
130 DRAW X, Y
140 NEXT J
150 DRAW XX, YY
160 NEXT I
```

The resulting shapes are shown in figure 1.

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BEWARE THE LOST NUMBERS

I have already explained how to avoid renumbering your Adventure programs beyond recognition.

However, when your game is complete it will be desirable to renumber it, as it will look more professional.

Adventures have a particularly high number of GOTO and GOSUB statements. It is almost impossible to prove that all of these point to lines that exist. The chances are that you will have forgotten to write one of them!

A side benefit of renumbering the program is that this will identify any Undefined Line errors without the need for exhaustive playing. The unity, when run, will list the lines

BY KEITH CAMPBELL

that ought to be there but have gone missing.

Depending upon the Basic your machine runs, renumbering may also save some memory assuming you convert to smaller numbers.

This will not be achieved by the line numbers themselves being smaller, since these will always use 2 bytes each, however small.

The saving comes when the Basic holds GOTO and GOSUB numbers in ASCII form, thus using 1 byte for each digit.

Therefore, the smaller the numbers of the pointers, the less memory will be used.

Having decided, then, to renumber your program, when is the best time to do it? This will depend on what renumber facility you have.

Some machines, for example the BBC, have the feature built in, as will most disc operating systems.

On the other hand, machines like the TRS-80 require that a special program be pre-loaded before the Basic program which is to be renumbered.

If your machine is this type, you will have to take into account the memory requirement for the utility, and ensure that your ever-growing Adventure is not too big before you renumber it!

If it is not quite finished, then perhaps it will be best to renumber in two's to leave space for insertions, otherwise renumber in one's.

If you are getting very short on memory, you might find that you can load both programs as long as you don't try to run the Basic program — the renumber utility will probably not take up much more room than the space the Adventure requires to run in.

Finally, if you have followed my convention for numbering REMarks, delete these before renumbering.

Apart from giving you the extra space you might need, the REMarks will have lost their identifying last digit of 9 after renumbering, and will be more difficult to locate.

We're falling in love again . . .

The other evening I found myself in a green bedroom wearing pyjamas and carrying a handbag.

Feeling somewhat weary I decided to have a short snooze, so I undressed and hopped into bed. Imagine my embarrassment when, stark naked, I suddenly awoke in a crowded room where a party was in progress!

All the guests turned and stared at me, and I froze to the spot. Regaining my senses, I returned with all haste to the bedroom, had a good wash, and feeling much better, put on the lovely silk dress I'd found in a trunk in the corner.

There was no doubt that I looked fantastic in it. Good, I thought, putting on some make-up, Tom should find me quite seductive.

Before you jump to any conclusions, let me explain that I was sitting in front of a computer, playing Love, an Adventure for women.

The action takes place in Poke Hall, and the object is to tell in love with a character called Tom. This Adventure runs on a ZX81 with 16K Rampack.

I played it in a mixed group with Barbara, Steve and Peter, who provided the computer. I soon got the impression I

was already in love with Tom, as I found his cigarette lighter in my handbag.

Perhaps I ought to seduce him? Well, I obviously lacked a woman's intuition, because I couldn't even find Tom.

Meanwhile, Barbara was busily suggesting what clothes to wear and how to apply lipstick.

Steve and I were by now getting a little bored, and thinking up some fairly direct suggestions, which, being gentlemen, we refrained from mentioning in mixed company.

The game is certainly very suggestive, but Peter took the tape home to examine the listing and assured me that there were no naughty words in the program.

On the whole, Barbara felt that Love would be great fun played by a group of women. Personally, I would prefer to cavendish on those women than to actually play the game, but then it is advertised as an Adventure for women.

Strange, isn't it, that in these days of sexual equality, there are games especially for women, but not for men? Does this mean that all games not billed as 'for women' are suitable only for men?

Love is available from Remsoft of George Street, Brighton.



Welcome back to the Wild West where you'll experience excitement and adventure on the Warpath!

Here we continue to set out the rules for this thrilling conflict between Indians and the cavalry.

Once the Board has been prepared, you will be asked if you wish to review the Map. If you reply "Yes", the map will scroll across the screen until you press "ENTER".

Details of the numbers of each type of piece will appear at the top of the screen. The middle of the northern portion of the map will appear (the Troopers always move first) and play may commence.

The order of Play:

a) The Troopers and the General move first. The player may move all, some or none of the men.

b) All conflicts resulting from that movement are resolved.

a) The Indian now repeat steps (a) and (b).

d) These steps continue throughout the game until one of the winning conditions is met. This may occur during either the movement or the combat phase.

AS promised, we will now discuss two important arrays: PTABLE and TBOARD. Once we have completed these, we can prepare the map and set-up the pieces ready for play to start.

PTABLE is an array of 50 by 3 and is dimensioned in line 780 as P(50,3). It contains information on each man's:

Index 0: The position on the Board.

Index 1: Type of piece - trooper or Bowman etc.

Index 2: Attack flag

Index 0 will be set to zero when the man is eliminated. If a piece is in a temporary HOLD condition, it is negated.

INBOARD is shown in figure 1. It is an array of 39 rows and 24 columns and is a representation of the map surrounded by a 4-byte border.

This requires 936 "cells" and, if dimensioned in integer format, would need at least 1872 bytes (more if your computer does not have the DEFIN instruction).

This wastes memory since no cell will hold a number greater than 255. Instead, I have reserved an area of 936 bytes starting at location 31868 (see line 1100). Since it is not a dimensioned array the

only way I can access it is by PEEK and POKE.

When first initialised the centre is filled with 128's and the border with 99's. Each byte whose equivalent position on the map is occupied by a piece is given the value of the index of that piece (i.e. from 1 to 50). Those occupied by the garrison or Boulders are given the value of 60.

The border is a useful feature. In the original KRIEGSPIEL, I carried out the calculations necessary to ensure that a piece was not attempting to move off the map, but this added to the time required to make a move.

With a border, one need only check if the piece is stepping on to a 99. If he is then the move is illegal.

Now we need another algorithm which relates INBOARD to BIGSCREEN. Given BL, the location of the piece on INBOARD, it returns ML, the location on BIGSCREEN. This subroutine is in line 320. It also returns V3 which is the location of the piece in memory.

I think you will be able to see that since INBOARD is 24 columns wide and the first location is at 100, the variable Q is the row number. If you look at BIGSCREEN, you will see that odd numbered rows are offset by 4, hence the

WARPATH

Part three of Ron Potkin's wild west wargame series tells you how to set up the board. Although it is designed for a TRS-80, we hope there is sufficient detail to help you succeed in adding Warpath to your collection.

LAYOUT OF THE INTERNAL BOARD

Game is played in the area bounded by the four corners 100,1 to 520 & 835. It is initially filled with 128's. The outer margin is filled with 99's.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	1	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46
2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
9	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
12	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
13	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
14	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
15	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
16	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
17	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
18	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
19	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
20	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
21	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
22	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
23	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
24	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
25	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
26	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
27	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
28	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
29	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
30	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
31	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
32	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
33	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
34	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
35	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
36	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
37	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
38	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
39	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
40	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
41	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
42	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
43	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
44	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
45	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
46	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
47	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
48	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
49	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
50	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

need for "Q and I"

Provided the argument is less than 32768 this is faster and neater than "Q-2ndINT (Q / 2)". If X, the divisor, is a power of 2 the remainder can always be obtained by NUMBER AND (X - 1).

Now that all four arrays are defined, we can review how they all fit together:

● The whole game is controlled by PTABLE which we run through sequentially: troopers first followed by the Indians.

● Read index 0 from PTABLE and obtain the location of that piece on INBOARD. If the location is zero, the piece has been eliminated — go to the next piece.

● Obtain the type of piece from index 1, get the correct character from the H table and calculate the number of moves for the piece (variable MV).

● Use BL to calculate ML from line 320. The machine language routine in XS(1) is now used to calculate the rectangle to be selected from BIGSCREEN.

● Display the rectangle and prompt the player for his move. We do this by alternately printing both the character and the number of moves at the position SP so that the piece flickers.

● Assume the player wants to move the piece and presses a number key. The hex he wants to move to (variable NX) is calculated and a check is made



on IBOARD to see if the hex is empty. If it is not, the program returns to the prompt.

● If the move is legal several things happen:

- a) Print a CHR\$(128) — a space — on the screen at the old location.
- b) Print the character at the new location.
- c) Put 128 into position V3 on the IBOARD.
- d) Put the piece index into NX.
- e) Put the new location NX into index 0 in PTABLE.
- f) Transfer WINDOW back to BIG-SCREEN.

The listing this month will put the men, boulders and garrison on the map. As usual, load the Basic program containing both BIGSCREEN and PIECES from the last two months. Type in the listing below. We can now delete lines 821 and 2499 to 2610 — we no longer need the DEMONSTRATION DRIVER.

Save the program before you run it. By the way, I hope you are keeping the "UNRUN" versions. If you have only saved the RUN versions, the program will still work but you will have to avoid editing the lines from 1540 to 1560.

When you are asked for the scenario number, enter any number up to 9999. Type a number up to about 30 when asked to enter the number of boulders.

Next month, we are going to describe the SEARCH routine which will give you the chance to study some more Z80 machine language.

● If you are having difficulties entering Warpath into your type of computer please write in and let us know. We'll be interested to find out what your problems are and help tailor the write-up to offer advice on any computer which seems to be giving particularly difficult commands to translate.

WARPATH

to be continued
next month

WARPATH Part 3 — SET UP

```

130 SV(K)=SV(K)+1:PC(I,0)=BL:PC(I,1)=K:GOSUB300:PRINT$P,H(K):;G
OSUB140:POKEV3,I:GOSUB370:I=I+1:RETURN
140 IFK<>STHENRETURNELSE$F=BL:A1=CHR$(171):PRINT$P+3,A1:RETURN
320 Q=DINT((BL-100)/24):NL=8*BL-800-64*Q+4*(QAND1):V3=60+BL:RETU
RN
370 Q=0:GOTO390
380 Q=1:GOSUB320
400 Q=0:GOTO420
410 Q=1:GOSUB320
420 P=0:GOSUB190:SP=USR(NL+0):P=0:GOSUB190:RETURN
540 RETURN 'STUB
830 CLS:INPUT"REVIEW MAP":A1=LEFT$(A,1):$Y="Y"THENGOSUB650
840 GOSUB540:GOTO840
850 CLS:FORJ=224TO700STEP96:IFJ=0TO15:BL=J+N:GOSUB410:IFINKEY<
>""THENRETURNELSENEXT:NEXT:GOTO850
860 P=0:GOSUB190:K=1:IT=1:R3=2
870 READJ:IFJ=0THENFORJ=LJTOJ+504STEP72:GOSUB260:BL=JL-1+4*N:GOSU
B130:NEXT:K=(K+1):GOTO870ELSEJ=26:K=4
880 READNL:IFBL>0THENGOSUB130:GOTO80ELSEIFBL=-1THENK=K+1:GOTO88
0
890 BL=797:GOSUB380:FORJ=0TO2:PRINT$38+J*8,CHR$(128)+CHR$(188)+
CHR$(188):POKEB0+676+J,60:NEXTJ:PRINT$42,GT;A=CHR$(191):PRINT
$542,A:PRINT$646,A:PRINT$664,STR$(N3+6,176):A:PRINT$728,A:PR
INT$786,CS;A:POKE822+60,60:GOSUB370
980 READJ:IFJ=0THENPOKEB0+J,60:GOTO980
910 IFNT<=0THENRETURNELSE$F=495:FORI=1TONT
920 GOSUB260:BL=100+4*N+8*QINT(NM/16):IF(BL=629)OR(BL=630)OR(BL>79
5)OR(BL=653)THEN920ELSEGOSUB320:IFPEEK(V3)<0THEN920
930 Q=1:GOSUB390:POKEV3,60:PRINT$P,C3;
940 GOSUB370:GOSUB430:PRINTNT;I;:NEXTI:P=0:GOTO190
1000 GOSUB520
1085 RESTORE
1086 READM:IFM<=0THEN1086
1190 DATA182,100,138,-1
1210 DATA206,283,205,204,178,182,179,181,155,158,130,134,108,109
,725,726,749,748,750,773,774,772,724,-1
1210 DATA132,-2
1220 DATA700,782,727,775,798,-1

```

Make Friday your



Friday, March 11th sees the launch of Britain's most exciting microcomputing publication. Big deal.

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ur day of discovery.



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PUZZLING

A MIX-UP IS ON THE CARDS

Each of five boys wrote one of the words SURLY, THUMB, UNDER, VIXEN, WHACK on a card. Then each took a card one of the others had written.

Bob wrote the word taken by Charlie; Al took the word written by the boy who took the word SURLY; Dan wrote the word taken by the boy who wrote the word VIXEN; Ed wrote the word taken by the boy

who wrote the word taken by Ed himself.

In no case did the word a boy wrote and the word he took begin with consecutive letters.

Now, if you've managed to follow all that, breathe in, don't panic, count to 10 and tell us the word written by Bob and the word on the card taken by Dan.

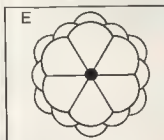
Paul McClenon

A BLOOMING PROBLEM

Farmer Nure has spent the last four years developing his unique plant, *rosa patnotica*, for show.

Nature, after following a strictly logical path in selecting each petal's colour in successive blooms, then threw in an unseasonal frost and killed the fifth generation before it blossomed (see [E] below).

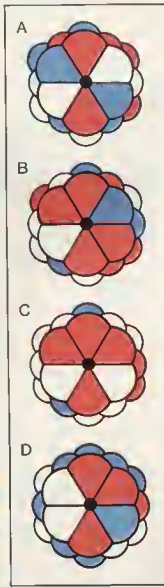
Can you work out how it would have been coloured?



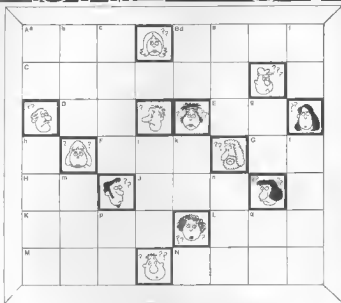
We are giving away 10 Hungarian Rings to 10 Puzzling fanatics who can solve Farmer Nure's blooming problem before March 12th.

Vulcan Electronics have put forward 10 of their brain-teasing ring puzzles (pictured below) for the first 10 solutions out of the hat. Once jumbled up they may never be solved again.

Just colour in the "E" bloom above and send it to: A Blooming Problem, Computer & Video Games, 8 Herbal Hill, London EC1R 5JB.



PUZZLING



FACING UP TO A CROSSNUMBER

Just in case this is new to any of you present here today — the puzzle is similar to the crossword in that one digit is entered in each square instead of one letter and numbers are formed Across and Down instead of words.

The main differences are that in crossnumbers the clues can be much more inter-related and initially perplexing (B across — see g down; g down — see B across!) and, in this particular version, some of the clues are so deliberately vague as to require a calculator or short computer program to search for the one answer among several possibilities.

So, with one hand on the keyboard and tother round the pencil, here we go...
Clues: Capital letter refer to Across clues, lower case to Down clues.

ACROSS

- The square of the last 2 digits of C
- Prime

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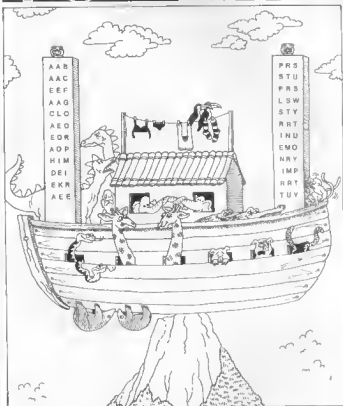
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PUZZLING



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Just how Noah managed to land the Ark on Ararat is glossed over in all the literature. It can now be placed on record that he landed with a bump like that of a hanglider whose wing has prematurely folded.

The result was to turn his

menagerie into a macedoine — has ZOO became, literally, an OOO.

Twelve of the six-letter specimens had their letters re-arranged into alphabetical order and split in half. The two lists were then splashed around in rather random fashion.

Before Noah could lower the gangplank he had to match the correct parts and so order the letters that our familiar names re-appear, otherwise the world would be stuck with a HHRSTU instead of a THRUSH!

The whole of creation was at stake and if he didn't sort things out right now, the evolutionists would have a field day in the future.

So he set to and did his best to give the world back a batch of animals it might be able to pronounce.

Can you give him a hand and tell him which 12 animals can be unloaded

BY TREVOR TURAN

DIFFERENT
DIGIT CODE

Each different symbol represents a different digit. And you can assume the obvious 0 is 0 and 1 is 1.

Can you work out the value of the others to complete an addition sum?



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VOLCANOES to get past alive. If you can't, an ever increasing amount of white hot Lava to avoid the closer you get to the witches cavern.

VAMPIRE RATS that cling to your ship, making your controls sluggish and finally if you are not careful dragging you down to your destruction.

CAVE INS should you hit the side of the cave with your Laser Cannon or Bomb, part of the roof will cave-in on you. The greater the 'landslide' the more death!

THE NEARER you get to the Witches Cavern, the more her Defences she will throw at you at once. Should you survive all of them (highly unlikely) then you must contend with the Witch herself! Avoid being turned to stone by her spells while attempting to destroy her wicked Heart!

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We would prefer a tape and listing but can work from just a tape and will return it to you if it doesn't find its way into the magazine. We will also need an additional sheet explaining the game and its theme. And any documentation like lists of variables or how certain routines are working, would be of great help to beginners.

This form will merely help us to keep a check on your game as it goes through our testing process and make sure we have all the information we need to present it properly in the magazine.

If you don't want to cut up the magazine, we will accept photocopies or close copies of this page. This form will be appearing regularly in C&VG issues from now on.

Remember we pay £10 for each listing published and you could win our Programmer of the Year Contest where we will try to turn the winner into a best-selling games author.

Program name: . . .

Machine
make: . . .

Model . . .

Other models it
should run on:

Number of K
needed to run it

Other equipment (joysticks, Extended
Basic, add ons, etc.) needed to run it: .

Author's Christian
name: . . .

Sur-
name: . . .

Address: . . .

Tel: . . .

Date: . . .

Type of game: (If original
please say so)

Loading instructions:

Game instructions: (If not included
in the listing) . . .

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Evaluator's comments

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to publish ☐

Name of
evaluator: . . .

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tidying up ☐

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sent: . . .

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MACHINE CODE

DECISION MAKING AND THE MICRO

The real power of computers comes from the way they can make decisions and perform different actions according to different values of the input data.

We will now start to look at the 'decision making' instructions in assembly language.

In Basic we have instructions of the form "IF condition THEN GOTO line number" where the condition may be a complicated expression involving arithmetic, logical and comparison operators.

In assembly language, however, the only conditions we can use directly involve the sign, zero, carry and overflow flags.

The first type of conditional jump we are going to look at is the Branch or Relative Jump, and the instructions available on the 6802, 6809 and Z80 are listed in tables 1, 2 and 3.

The only conditional jumps on the 6802 are the eight branch instructions shown in table 1, but the 6809 and Z80 have others which we will deal with later.

In Basic we have to use line numbers to refer to the program instructions. In assembly language we use labels instead of line numbers.

The editing programs in some assemblers use line numbers but this is purely to keep the lines in the right order and it is impossible to refer to the line numbers in the assembly language program.

The standards for 6802, 6809 and Z80 assembly languages specify that labels may be up to six characters long, the first character must be alphabetic, and

any subsequent characters may be alphabetic or numeric.

Thus, START, FINISH, L99, A2B3, are valid labels but *START, 9L are invalid.

Also, register names, opcode mnemonics and other reserved words are usually not allowed as labels, but even when your assembler allows reserved words to be used as labels it is not good practice to use them.

Some Z80 assemblers require that a label must be followed by a colon. In this case it may be possible to use a reserved word as a label because the colon permits the assembler to distinguish between

For example, ADD used as a label and ADD used as an opcode mnemonic.

To see how we use labels with the branch or relative jump instructions, let us look at simple counting loops in the three assembly languages

Table 1	Hex Object Code	Label	Instruction
6802	A2 DA EA 00 FD	START LOOP	LDX #10 DEX BNE LOOP
6809	86 10 4A 26 FD	START LOOP	LDA #10 DECA BNE LOOP
Z80	05 10 05 20 FD	START LOOP	LD B, 10 DEC B JR NZ LOOP

We start by setting a register to the initial value of the count, then decrement the counter register. If the register is not zero we jump back to the decrement instruction labelled LOOP.

When the counter register becomes zero, after 10 steps, the program will continue with the next instruction.

The branch or relative jump instruction

non introduces a new addressing mode, *relative addressing*.

The second byte of the object code is a displacement specifying how many bytes to jump; regardless of the absolute address of the instruction the jump will be to the address a specified number of bytes away.

The displacement is a signed binary number, with values from 0 to 7F hex (0 to 127 decimal) representing a forward jump and values from 80 to FF hex (128 to 255 decimal) representing a backward jump.

The absolute address, which is the destination of the relative jump, is calculated by taking the absolute address of the byte immediately following the relative jump instruction and adding the displacement, making allowance for the sign.

In the examples above, if the first line began at address 1000 hex the second line would begin at 1002 hex, the third line would begin at 1003 hex and the address of the byte following the relative jump instruction would be 1005 hex.

The value of FD hex for the displacement, interpreted as a signed number, is equivalent to -3, so the destination address is 1005 + (-3), or 1002.

To illustrate a forward relative jump consider the following examples.

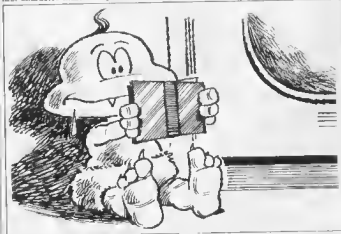
Address	Hex Object Code	Label	Instruction
6512 1050 1052	90 2E		BCC DEST
6809 1050 1052	24 2E	DEST	BCC DEST
Z80 1080 1050 1052		DEST	JR NC, DEST
1080		...	

The destination, 1060 hex, is calculated by adding the displacement, 2E hex, to the address of the byte following the relative jump instruction, 1052 hex, or conversely the displacement is calculated by subtracting 1052 hex from 1060 hex.

WITH A HOP, A SKIP AND JUMP!

As well as these relative jumps we have absolute jumps, where the destination address is included in the instruction.

The Z80 instruction set includes conditional absolute jumps, which are shown in table 4. On the 6802 and 6809 relative addressing is used for all con-



BY TED BALL

ditional jumps, and in other addressing modes we have only the unconditional jump, with opcode mnemonic JMP.

In assembly language we can write a label or a numeric value for the destination address, for example:

```
6802 & 6809
    JMP $1000
    JMP START

Z80
    JP 1000H
    JP NZ, START
```

The object code format for the unconditional jump instructions is one byte for the opcode followed by two bytes for the operand.

The operand appears in the usual format for a two byte operand, with the low byte first and the high byte second on the 6802 and Z80, and with the high byte first and the low byte second on the 6809. Thus we would have:

Hex Object Code	Source Code
6802 4C 00 10	JMP \$1000
Z80 C3 00 10	JP 1000H
6809 50 10 00	JMP \$1000



FLAGS SIGNAL THE MESSAGE

In order to use the conditional jumps we need to know how the other instructions affect the flags. It is not difficult to learn which flags are affected by various classes of instruction, but you will need to look this up in a reference manual at first.

In most cases we only need to bother with the sign, zero and carry flags and it is usually quite easy to work out how these flags are affected by most instructions.

However, there are complications when signed arithmetic is involved, and next month we will look more closely at the mechanics of signed binary arithmetic, paying special attention to the values of the carry and overflow flags in the various cases that can arise.

Hex Code	Instruction	6802 Branch Instructions Meaning
10	BPL label	Branch if plus (positive)
30	BMI label	Branch if minus (negative)
50	BVC label	Branch if Overflow clear
70	BVS label	Branch if Overflow set
90	BCC label	Branch if Carry clear
B0	BCS label	Branch if Carry set
D0	BNE label	Branch if Not equal (Not Zero)
F0	BEQ label	Branch if Equal (Zero)

Hex Code	Instruction	6809 Branch Instructions Meaning
20	BRA label	Branch always
21	BRN label	Branch never
22	BRI label	Branch if higher (greater)
23	BLS label	Branch if lower or same
24*	BCC label	Branch if Carry clear
24*	BHS label	Branch if higher or same
24*	BHS label	Branch if Carry set
25*	BCL label	Branch if lower
25*	BNE label	Branch if Not Equal (Not Zero)
25*	BNE label	Branch if Equal (Zero)
26	BEQ label	Branch if Overflow clear
27	BVC label	Branch if Overflow set
28	BVS label	Branch if Plus (positive)
29	BVS label	Branch if Minus (negative)
2A	BPL label	Branch if Greater or Equal
2B	BMI label	Branch if Less Than Zero
2C	BGE label	Branch if Greater Than Zero
2D	BLT label	Branch if Less Than or Equal to Zero
2E	BGT label	Branch if Greater Than or Equal to Zero
2F	BLE label	Branch if Less Than or Equal to Zero

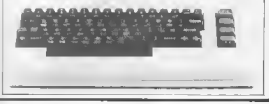
*Note two different opcode mnemonics for the same object code.

Hex Code	Instruction	Z80 Relative Jumps Meaning
10	QJNZ label	Decrement B & Jump if Not Zero
10	JR label	Jump Relative
20	JR NZ, label	Jump Relative if Not Zero
20	JR Z, label	Jump Relative if Zero
30	JR NC, label	Jump Relative if No Carry
30	JR C, label	Jump Relative if Carry

Hex Code	Instruction	Z80 Absolute Jumps Meaning
C3	JP label	Jump
C3	JP NZ, label	Jump if Not Zero
C2	JP Z, label	Jump if Zero
CA	JP NC, label	Jump if No Carry
D2	JP C, label	Jump if Carry
DA	JP PO, label	Jump if Parity Odd/Overflow set
E2	JP PE, label	Jump if Parity Even/Overflow clear
EA	JP P, label	Jump if Sign Positive
F2	JP M, label	Jump if Sign Negative

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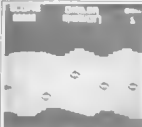
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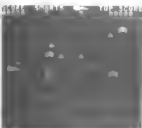


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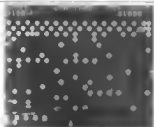
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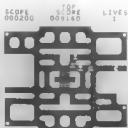


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